



**U.S. Fish & Wildlife Service**

## **Ohio River Islands National Wildlife Refuge**

**Final Comprehensive Conservation Plan**

**2002**

## **Comprehensive Conservation Plan**

### **INTRODUCTION AND BACKGROUND**

This Comprehensive Conservation Plan (CCP) has been prepared for Ohio River Islands National Wildlife Refuge (Refuge). The CCP is a management tool to be used by the Refuge staff. It will help guide management decisions over the next 15 years, and set forth strategies for achieving Refuge goals and objectives within that timeframe. Overriding considerations reflected in the plan are that fish and wildlife conservation requires first priority in refuge management, and that wildlife-dependent recreation is allowed and encouraged as long as it is compatible with, or does not detract from, the mission of the National Wildlife Refuge System or purposes of the Refuge. This chapter discusses the following topics: a brief description of the Ohio River Islands National Wildlife Refuge and how it came into existence; the purpose of and need for the plan; the purpose and vision of the Refuge; the National Wildlife Refuge System mission, goals and guiding principles, including the legal context which guides management; and other relevant plans and partnerships that affect Refuge management.

This plan details program planning levels that are above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. This plan does not constitute a secure commitment for staffing increases, or funding for future refuge-specific land acquisitions, construction projects or operational and maintenance increases.

#### **Refuge Overview: History of Refuge Establishment, Acquisition, and Management**

The Ohio River Islands National Wildlife Refuge was established in 1990 under authority of the Fish and Wildlife Act of 1956, and was the first Refuge in West Virginia. The Refuge (see Figure 1) currently consists of all or part of 21 islands and three mainland tracts in the Ohio River, encompassing 3,221 acres (Figure 2) of valuable fish and wildlife habitat within one of the nation's busiest waterways. As acquisition progresses, the Refuge may include up to 35 river islands. The acquisition focus area stretches nearly 400 river miles from Shippingport, Pennsylvania, to Maysville, Kentucky and includes four states (Pennsylvania, Ohio, West Virginia, and Kentucky).

In addition to the islands, one hundred embayments and wetlands adjacent to the mainland are within the approved boundary for the Refuge. These areas provide excellent fish and wildlife habitat and would be a valuable addition to the Refuge. Thus, the Refuge could potentially add over 8,000 acres of islands, wetlands, back channels and underwater habitat. The plans for additional land protection will be addressed in a future Land Protection Plan (LPP).

There are a total of 40 islands remaining in the Upper Ohio River. Twenty-one are part of the Refuge at the present time. These island habitats contain near natural assemblages of plants and animals that are endemic to the river. The distribution of bottomland and riparian habitats, and deep and shallow water aquatic habitats, make these areas extremely beneficial to fish and wildlife species. A huge diversity of species (waterfowl, shore and wading birds, neotropical migratory land birds, furbearers, fish and benthic organisms, including freshwater mussels) find these areas invaluable for resting, feeding, nesting, spawning, and other necessary life functions. The deep and shallow water habitats associated with the islands are major fish and mussel production areas of the Ohio River. The often undisturbed island shorelines, especially the heads and backchannels, are favored sport fishing areas.

Over 200 bird species (76 of which breed there), 42 mollusk species, 15 species of reptiles and amphibians, 101 species of fish, 25 mammals, and 500 species of plants have been identified so far within the Refuge.

The shallow waters of the river provide quality habitat for freshwater mussels, including at least two federally endangered species, the pink mucket and fanshell. Bald eagles, peregrine falcons and Indiana bats also use the Refuge habitats. In addition, many species of plants and animals considered endangered, rare, or of special interest in the four states occur on the Refuge.

The Ohio River is rich in history, and many areas of historical and cultural significance are located on or adjacent to the islands. Some notable examples include early explorers' accounts of Native Americans and their culture, George Washington's survey expeditions, the use of the river as a major transportation route by early settlers and pioneers heading west, battles fought during the Civil War, and finally, use for navigation and industry.

<b>Parcel Name</b>	<b>Land</b>	<b>Underwater</b>	<b>Total</b>
<i>Phillis Island</i>	<i>39</i>	<i>--</i>	<i>39</i>
<i>Georgetown Island</i>	<i>16.2</i>	<i>--</i>	<i>16.2</i>
<i>Wheeling Island</i>	<i>17.8</i>	<i>~30</i>	<i>47.8</i>
<i>Paden Island</i>	<i>80.8</i>	<i>46.9</i>	<i>127.7</i>
<i>Williamson Island,</i>	<i>125.6</i>	<i>128</i>	<i>261.7</i>
<i>and Witten Towhead Island</i>	<i>8.1</i>		
<i>Crab Island</i>	<i>0.6</i>	<i>7.2</i>	<i>7.8</i>
<i>Wells Island</i>	<i>43</i>	<i>81.4</i>	<i>124.4</i>
<i>Mill Creek Island</i>	<i>19</i>	<i>58.8</i>	<i>77.8</i>
<i>Grandview Island</i>	<i>8</i>	<i>85.7</i>	<i>93.7</i>
<i>Grape/Bat Island</i>	<i>44.5</i>	<i>70</i>	<i>114.5</i>
<i>Middle Island</i>	<i>235</i>	<i>91</i>	<i>326</i>

<i>Broadback Island</i>	51	78.6	129.6
<i>Buckley Mainland</i>	49	--	49
<i>Buckley Island</i>	160	75.7	235.7
<i>Muskingum Island</i>	93	167.3	260.3
<i>Neal Island</i>	104	121.6	225.6
<i>Buffington Island</i>	162	85.9	247.9
<i>Letart Island</i>	28.6	142.9	171.5
<i>Manchester #1 Island, and Manchester #2 Island</i>	20.4 93.6	315.3	429.3
<i>Buffalo Creek</i>	19	--	19
<i>Captina Island</i>	17	61.4	78.4
<i>Captina Mainland</i>	138	--	138
<b>SUBTOTAL OF REFUGE OWNED PROPERTIES</b>	1,573.2	1,647.7	3,220.9

\* *Non-Refuge islands are presented in Figure 3 (page 35).*

Public uses of all types have occurred on and around the Ohio River Islands in recent years. The relatively undisturbed nature of many of the islands have made them popular areas for nature study, hunting, fishing, camping, picnicking, and pleasure boating. As islands are acquired for the Refuge, only those uses determined to be compatible with Refuge purposes will be allowed to continue.

Refuge management in the past has concentrated on preserving, restoring, and enhancing the diversity and abundance of fish and wildlife populations characteristic of the floodplain forests and wetlands of the Ohio River.

### **Purpose of and Need for Action**

The purpose of the plan is to provide overall guidance for the protection and use of the Refuge during the next fifteen years. Under the provisions of the National Wildlife Refuge System Improvement Act of 1997, the U.S. Fish and Wildlife Service (Service) is required to develop comprehensive conservation plans for all lands and waters of the Refuge System. The National Environmental Policy Act (NEPA) also ensured that the Service assessed the environmental impacts of any actions taken as a result of implementing the CCP.

This plan is also needed to:

- provide a clear statement of the desired future conditions for habitat, wildlife, facilities and people;

- provide Refuge neighbors and visitors with a clear understanding of the reasons for management actions on and around the Refuge;
- ensure that management of the Refuge reflects the policies and goals of the National Wildlife Refuge System;
- ensure the compatibility of current and future uses of the Refuge;
- provide long-term continuity in Refuge management; and
- provide a basis for Refuge operation, maintenance, and developmental budget requests.

## **Refuge Purpose**

The Fish and Wildlife Act of 1956 outlines the Refuge's primary purpose "*...for the development, advancement, management, conservation, and protection of fish and wildlife resources...*" "*...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services.*"

## **Refuge Vision Statement**

*The Ohio River Islands National Wildlife Refuge will create a linked network of over 12,000 acres of floodplain forests, wetlands, and aquatic habitat stretching over 400 miles from Pittsburgh to Cincinnati. These refuge lands and waters will fulfill the needs of fish, wildlife and plants that are native to "big river" ecosystems. Through reforestation, exotic species control, and wetland restoration, the Refuge will serve as an anchor for biodiversity and a model for habitat restoration throughout the Ohio River Valley ecosystem. We will forge habitat and management links with other units of the National Wildlife Refuge System.*

*The Ohio River Islands National Wildlife Refuge is committed to the preservation, conservation and enhancement of a quality river environment for the people of the Ohio River Valley. In this pursuit, we will work with partners to provide a wide range of environmental education programs and promote high quality wildlife-dependent recreational opportunities, to build a refuge support base and attract new visitors. Just as the Ohio River is an important corridor for transporting people and goods, it is also an important natural corridor for migratory birds, fish, and endangered freshwater mussels. Encouraging an understanding and appreciation for the "wild" Ohio will be a focus of the Ohio River Islands National Wildlife Refuge for generations to come.*

## **Legal and Policy Guidance**

This section presents hierarchically, from the national level to the local level, highlights of U.S. Fish and Wildlife Service policy, legal mandates, and existing resource plans which directly influenced development of the CCP.

### *The U.S. Fish and Wildlife Service and its Mission*

National Wildlife Refuges are managed by the U.S. Fish and Wildlife Service, part of the Department of Interior. The mission of the U.S. Fish and Wildlife Service is:

*"...working with others, to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people."*

The Service has specific trustee responsibilities for migratory birds, threatened and endangered species, anadromous fish, and certain marine mammals, as well as for lands and waters administered by the Service for the management and protection of these resources.

### *The National Wildlife Refuge System and its Mission*

The Service's National Wildlife Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection. Over 530 National Wildlife Refuges covering over 92 million acres are part of the national network today. With over 77 million acres in Alaska and the remaining 15 million acres spread across the other 49 states and several island territories, over 34 million visitors annually hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretive activities on Refuges.

In 1997 the National Wildlife Refuge System Improvement Act (Refuge Improvement Act) was passed. This legislation established a unifying mission for the Refuge System, a new process for determining compatible public use activities on Refuges, and the requirement to prepare CCPs for each Refuge. The Refuge Improvement Act states that first and foremost, the Refuge System must focus on wildlife conservation. It further states that the national mission, coupled with the purpose(s) for which each Refuge was established, will provide the principal management direction for each Refuge.

The mission of the National Wildlife Refuge System is:

*"...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."* (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57)

With regards to public use, the Refuge Improvement Act declared that all existing or proposed public uses must be "compatible" with each Refuge's purpose. Six wildlife-dependent public uses were highlighted in the legislation as priorities to evaluate in CCPs. The six uses are: hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

### *Fulfilling the Promise*

This 1999 report resulted from the first-ever System Conference held in Keystone, Colorado in October 1998, and attended by every Refuge manager in the country, other Service employees, and leading conservation organizations. The report contains 42 recommendations packaged with three Vision statements dealing with *Wildlife and Habitat*, *People*, and *Leadership*. The recommendations in the *Fulfilling the Promises* report helped guide the development of goals and objectives in this draft plan.

Administration of National Wildlife Refuges is governed by various international treaties, federal laws, and regulations affecting land and water as well as the conservation and management of fish and wildlife resources. Policies for management options of the Refuge are further refined by the Secretary of the Interior and policy guidelines established by the Director of the U.S. Fish and Wildlife Service. As noted previously, the Fish and Wildlife Act of 1956 outlines the Ohio River Islands National Wildlife Refuge's primary purpose.

Key legislation affecting Refuge management includes:

- The National Wildlife Refuge System Improvement Act of 1997, which is the "organic" law for the System. The Act amends the National Wildlife Refuge System Administration Act of 1966.
- The National Wildlife Refuge System Administration Act of 1966, which authorizes the Secretary of the Interior to permit uses of a Refuge "whenever he determines that such uses are compatible with the major purposes for which such areas were established."
- The Refuge Recreation Act of 1962, which requires that any recreational use of Refuge lands can be an appropriate incidental or secondary use if it is practicable and not inconsistent with the primary objectives for which a Refuge was established, and that these uses not interfere with other previously authorized operations.
- The National Historic Preservation Act of 1966 and the Archeological Resources Protection Act of 1979, which provide for the protection and rehabilitation of historic and archeological resources that occur on any Refuge.

The Refuge Improvement Act establishes a mission for the System, policy direction, and provides significant guidance for management and public use for all units of the Refuge System. The act ensures that, for the first time, the public is formally involved in decisions on recreation and other public uses on units of America's 93 million acre National Wildlife Refuge System. The legislation requires the Secretary of the Interior to ensure that the mission of the Refuge System and purposes of the individual Refuges are carried out. It also requires the Secretary to maintain the biological integrity, diversity, and environmental health of the Refuge System. Continued growth of the Refuge System is to be planned and directed in a way that will contribute to conservation of the ecosystems of the United States.

The Act further stipulates that each comprehensive conservation plan "shall identify and describe:

(A) the purposes of each Refuge comprising the planning unit [*found in Chapter 1 of this document*];

(B) the distribution, migration patterns, and abundance of fish, wildlife, and plant populations and related habitats within the planning unit [*Chapter 3*];

(C) the archaeological and cultural values of the planning unit [*Chapter 3*];

(D) such areas within the planning unit that are suitable for use as administrative sites or visitor facilities [*Chapter 4*];

(E) significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants within the planning unit and the actions necessary to correct or mitigate such problems [*Chapters 1,2 and 3*]; and

(F) opportunities for compatible wildlife-dependent recreational uses [*Chapter 4*]."

The legislation recognizes that compatible wildlife-dependent recreational uses are legitimate and appropriate public uses of the Refuge System. Several key terms are defined as follows:

*Compatible Use* - "...a wildlife-dependent recreational use or any other use of a Refuge that, in the sound professional judgement of the Refuge Manager, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the Refuge."

*Wildlife-dependent recreational use* - "...a use of a Refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation."

*Sound professional judgement* - "...a finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of this Act and other applicable laws."

Appendix F contains a select list of summaries of other federal laws and treaties used for administration of the Refuge System and management of the Refuge. The Draft CCP, written inclusively as an Environmental Assessment (EA), was written to fulfill compliance with the National Environmental Policy Act.

#### *North American Waterfowl Management Plan*

This Plan documents the strategy between the United States, Canada, and Mexico to restore waterfowl populations through habitat protection, restoration, and enhancement. Implementation of the plan is at the regional level. Ten regional habitat "Joint Ventures" are partnerships involving Federal, State and provincial governments, tribal nations, local businesses, conservation organizations, and individual citizens. The Ohio River Islands Refuge lies on the edge of the Atlantic Coast Joint Venture and the Mississippi Joint Venture. Three priority focus areas are already identified for protection (or enhancement) in West Virginia, totaling 40,550 acres. Both wetlands and adjacent uplands are part of the focus areas. Along the Ohio and Kanawha River Valleys, 6,550 acres have been identified. The Ohio Valley has been recognized as important for waterfowl by the West Virginia DNR, identified as one of the state's waterfowl focus areas for the Atlantic Coast Joint Venture.

The goal for the Atlantic Coast Joint Venture is:

*"Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area."*

#### *Partners In Flight*

Of the 20 species on the West Virginia Partners in Flight priority Species List, at least 16 are known to nest along the Ohio River Valley. Osprey, which have been reintroduced into the valley by a cooperative effort of state, federal and private partners, are now nesting successfully along the Ohio River. The largest great blue heron rookeries in the state are also located within the Ohio River Valley.

The Partners in Flight Program is developing a plan for the area. The plan utilizes existing data to rank landbird species as to their priority for conservation. Habitat loss, landbird population trends, and vulnerability of species and habitats to threats are all factors used in the priority ranking of species. Further, the plan will identify focal species for each habitat type from which population and habitat objectives and conservation actions will be determined. This list of focal species, objectives and conservation actions will help direct landbird management on the Refuge.

### *Regional Wetlands Concept Plan*

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation's wetlands. The Act directed the Department of Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority attention for acquisition by federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, the Northeast Region of the U.S. Fish and Wildlife Service completed a Regional Wetlands Concept Plan to provide more specific information about wetlands resources in the Northeast. The Regional Plan identifies a total of 850 wetland sites that warrant consideration for acquisition, and also identifies wetland values, functions, and potential threats for each site.

### *Ohio River Valley Ecosystem Strategic Plan, 1999*

Throughout the last decade, the Service has been putting more emphasis into understanding how the parts of an ecosystem interrelate and affect the long-term conservation of natural resources. To this end, the Service has initiated new partnerships with private landowners, state and federal agencies, corporations, conservation groups, and volunteers. Implementing an ecosystem team approach to management has been a top national priority for the Service. Fifty-two ecosystem teams were formed across the country, typically using large river watersheds to define ecosystems. Individual ecosystem teams are comprised of both Service professionals and partners, who work together to develop goals and priorities for research and management.

The Ohio River Valley Ecosystem (ORVE) includes portions of ten states and straddles three Service administrative regions (Northeast, Southeast, and Northcentral). The Ohio River Valley Ecosystem Team is charged with the development and implementation of a strategic plan for conserving Service trust resources in the ORVE.

The following eight priorities have been identified, each encompassing numerous action strategies:

"In cooperation with partners...":

- reverse the decline of native aquatic mollusks within the Ohio River Valley Ecosystem with emphasis on endangered, threatened and candidate species and species of concern.
- reverse the decline and achieve stable, viable populations of migratory landbirds and other bird species of concern.
- reverse the decline of native fishes with emphasis on interjurisdictional, listed, and candidate species, and species of concern.
- protect and restore karst/cave habitat supporting listed and candidate species and species of concern.
- protect and restore wetland, riverine and riparian habitat in the Ohio River watershed for the protection and enhancement of migratory waterbirds and other wetland dependant species of concern.
- reduce the decline and promote the recovery of rare resources identified as listed/proposed threatened and endangered species, candidate species and species of concern [not otherwise addressed in the other Resource Priorities].
- achieve the necessary level of protection for those high priority areas within the Ohio River Valley Ecosystem that would help meet the goals of the ORVE Team.
- promote and support sustainable fish and wildlife-dependent recreational uses while maintaining the long-term health of the ecosystem and the Service's trust resources.

## **Comprehensive Conservation Plan**

### **Planning Process**

The key to effective conservation begins with effective community involvement. To ensure that future management of the Refuge is reflective of the issues, concerns and opportunities expressed by the public, a variety of public involvement techniques were used.

- Open Houses and Public Information Meetings were held throughout the four states (Pennsylvania, Ohio, Kentucky and West Virginia) at 18 different locations during the spring and summer of 1998. Meetings were advertised locally through news releases, paid advertisements, radio broadcasts, and through our mailing list. For each town, the "open house" session was planned where people could informally learn of the project, and have their questions or concerns addressed in a "one-on-one" situation. The evening Public Information Meeting sessions usually included a slideshow presentation of the Refuge, a brief review of the Refuge System and the planning process, and a question and answer session. Participants were encouraged to actively express their opinions and suggestions.
- An "Issues Workbook" was developed to encourage written comments on topics such as wildlife habitats, exotic nuisance species, land protection, and public access to Refuge lands. These workbooks were mailed to a diverse group of over 1,200 people on our mailing list, given to people who attended a public meeting, and distributed to anyone who requested one. Through the workbook, we asked for public input on the issues and possible action options, on the things people valued most about the Ohio River, on their vision for the future of the natural resources, and on the Service's role in helping to conserve, protect and enhance fish and wildlife and their habitats.
- An internet site was developed which included an online Issues Workbook and schedule of upcoming meetings.

The Service mailed out and distributed a Planning Update in October 1998 which summarized responses to the Issues Workbook. The update represented the opinions of those who received, completed and returned the workbook. We also briefed local members of Congress on the input we had received.

The planning team held four workshops to identify and discuss management strategies to deal with issues pertaining to fisheries and fishing, public uses, and land protection. The diverse group of individuals and groups participating in the workshops included adjacent landowners, non-governmental organizations such as sportsmens groups and environmental organizations,

state fish and wildlife agencies, state legislators, local businesses, and other interested and affected people.

The Draft CCP/EA was made available for public review and comment, providing the public another opportunity to discuss issues and offer solutions. We reviewed and considered all letters received. The Draft CCP/EA was originally released for 46 days of public review from February 13 to March 31, 2001, then extended an additional two weeks to April 13.

We received numerous responses by way of oral testimony at public hearings or through submission of written or electronic documents. Comments were received from Federal and State agencies, local and national conservation and recreation organizations, and local residents. In the following section, we identify the issues raised and our response to those issues.

We also held four public meetings to solicit additional comments as follows:

- March 20, 2001 Community College of Beaver County, Monaca, PA
- March 22, 2001 Maysville Community College, Maysville, KY
- April 3, 2001 Historic Lafayette Hotel, Marietta, OH
- April 4, 2001 Parkersburg Municipal Building, Parkersburg, WV

Based on the analysis in the Draft CCP/EA, and our review of public comments, the Service has selected a Preferred Alternative. The Preferred Alternative basically includes all of Alternative B, the Proposed Action in the Draft CCP/EA, with a few modifications that are discussed in Chapter 4 of this document, and in our responses to comments. We also issued a Finding of No Significant Impact (FONSI). The FONSI establishes that our decision will not significantly effect the quality of the human environment and does not require preparation of an Environmental Impact Statement.

The CCP must be formally revised within fifteen years (or earlier, if it is determined that conditions affecting the Refuge have changed significantly). The plan will be monitored to ensure that the strategies and decisions noted within are accomplished. Data collected in association with routine inspections or programmatic evaluations will be used to continually update and adjust management activities.

## **Planning Issues**

A number of issues emerged during the planning process noted above. Some of the issues that are very important to people cannot be solved by the Service with this plan. Nevertheless, we have considered them throughout the planning process, and have developed a plan that may not resolve every problem, but would not worsen the problem either. These issues and concerns, voiced by the public during the scoping process, include:

- There is a perception by the general public of degraded water quality in the Ohio River, and that it therefore has a continuous and negative effect on the resources and use of the Refuge and other important habitat along the river. Some of the various types of pollution identified by the public included chemical/oil spills, untreated sewage discharge, illegal

dumping, industrial discharges, and dredging and its associated release of contaminants into the water column. Non-point sources of pollution, including stormwater and agricultural runoffs, are a major concern.

- Populations and diversity of fish appears to have declined over the last two decades.
- Increased motorized boating may contribute to shoreline and island erosion, and serve as a source of contaminant and trash pollution. An increased use of jet skis and water skiing also may disturb wildlife.

The following key issues were addressed in the Draft CCP/EA:

**Issue 1** - Erosion of islands and banks, and sedimentation and siltation of shallow water embayment areas (specifically) and the river (in general) adversely affect water quality and the general bottom habitat conditions for mussels and other benthic invertebrates and fish populations. Sand and gravel dredging also physically impact island stability, and could damage all culturally important islands.

**Issue 2** - Important fish and wildlife habitat in the Refuge area is not being adequately protected from the impacts of development or misuse. To date, the four states, as well as non-governmental organizations, have not shown ample commitment to acquiring these important habitats. The past, continuing and future loss of habitat (such as the removal of trees and vegetative cover along the river shoreline) also enhances erosion.

**Issue 3** - The introduction and spread of invasive plants and aquatic species on Refuge lands and in the Ohio River threaten native riparian vegetation and freshwater mussel species. Among the most recognized of these nuisance exotics are the plants "Japanese knotweed" and "mile-a-minute" as well as the zebra mussel. Invasive species cost our Nation's economy an estimated \$123 billion annually and are second only to habitat destruction in threatening extinction of native species.

**Issue 4** - Public access to the river (and therefore, the islands) is often difficult or inadequate. Loss of river access is due to a number of factors, including the continued development of waterfront facilities, land acquired for commercial, industrial, or residential purposes, barge repairs, and docking areas. There is also a need to increase Refuge opportunities for people without boats.

**Issue 5** - The four state resource agencies contend that the current hunt plan is unnecessarily and overly restrictive with regard to hunting methods and species which may be hunted. Although hunting opportunities are currently offered on Refuge lands and throughout the Ohio River Valley, the agencies would prefer the Refuge adopt all State regulations on current and future Refuge properties.

**Issue 6** - Environmental education is limited within the Ohio River area. There are significant educational and research opportunities on and around the islands. The opportunity to educate

schoolchildren and the public about these interesting habitats should be a primary thrust of the Refuge planning effort.

**Issue 7** - Despite current outreach efforts, public awareness of the Refuge is low. Generally, the public (and particularly the non-boating public) is unfamiliar with: the Refuge's existence, regulations, mission and goals; the recreational opportunities it has to offer; and the important resources that are being protected.

**Issue 8** - Existing staffing levels and Refuge facilities are inadequate to meet present and anticipated future needs of the Refuge. To effectively serve the public, additional staff and an office/visitor contact station would likely be required.

**Issue 9** - The Refuge currently does not have a trapping program. State resource agencies have expressed that they would prefer and advocate the use of trapping as a public use on Refuge lands.

## **Refuge and Resource Description**

The geographic area encompassed by the plan is Ohio River Mile 0 (Pittsburgh, Pennsylvania) to 437 (Meldahl Dam). This chapter describes the refuge and the natural and cultural resources associated with it.

### **Physical Environment**

#### *Water Quality*

Present water quality in the study area is generally acceptable to good, with nearly neutral pH, good color, adequate dissolved oxygen (except for reduced levels just upstream of the locks and dams occasionally during the low flow months), and reasonably low iron and manganese concentrations. However, extensive periods of turbidity (due to high suspended sediment loads) and subsequent sedimentation of aquatic substrates is impacting both water and habitat quality. The principal cause of these problems is poor land management practices in the watershed (logging, mining, lack of buffer strips, removal of riparian habitat, agricultural runoff), both local and distant in nature. According to the Ohio River Valley Sanitation Commission, concentrations of pesticides, organic compounds, and heavy metals in fish flesh have dramatically decreased in the last ten years; however, recent data has revealed possible contaminants present in fish in certain Ohio River segments. Fish consumption advisories are in effect for all four states. Water quality continues to improve and is presently able to support a viable aquatic community.

#### *Topography/Soils*

The study area lies almost entirely within the Appalachian Plateau Physiographic Province except the extreme lower portion (containing only three islands) which is located in the Interior Low Plateau Physiographic Province. The average width of the Ohio River varies from 1,450 feet near the upper end to 1,600 feet near the lower end of Meldahl Dam.

The alluvial sediments in the study reach consist of glacial outwash fill of sand and gravel. These glacial outwash deposits are as much as 125 feet thick. They are composed primarily of sand and gravel derived from local Pennsylvanian and Permian age sedimentary rocks. Other sand and gravels are composed of granite, quartzite, vein quartz, and chert glacially transported from Canadian sources. Most of the river in the study reach flows on this alluvial outwash plain.

The islands were formed by accretion of flood deposits over gravel and rock bars to the height of the floodplain. Certain land use practices (e.g., mining, farming, and timbering) have resulted in extensive erosion in the last century along some mainland and island shorelines.

Most soils on floodplains and islands are classified as fine sandy or silt loams of the Huntington, Chagrin, and Linside series. The Huntington and Chagrin soils are very well drained while the Linside series are classified as moderately well drained and somewhat poorly drained soils. A small amount of poorly drained Melvin silt loam is located in the study area, primarily on Blennerhassett and Grape Islands and on the mainland of Boaz Swamp.

### *Geology/Hydrology*

The Ohio River begins at the confluence of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania. The Monongahela River rises in northcentral West Virginia and the Allegheny River rises in southwestern New York. The 437 mile study reach of the Ohio River begins at Pittsburgh, forms the border of West Virginia and Kentucky with Ohio, and ends at the Meldahl Lock and Dam. The first 300 river miles portion of the study reach flows in a southwest direction and turns in a westerly direction at the Kentucky-West Virginia border for the last 140 miles. The river in the study reach falls approximately 0.44 feet per mile. The study reach traverses 12 navigation pools on the Ohio River. These are, in descending order: Emsworth, Dashields, Montgomery, New Cumberland, Pike Island, Hannibal, Willow Island, Belleville, Racine, R. C. Byrd, Greenup, and Meldahl.

The Ohio River flows down a very gently sloping plateau consisting of almost horizontal sedimentary strata of sandstones, shales, and limestone. The bed of the Ohio River, as mentioned earlier, is covered by deep alluvial deposits composed mainly of sand and gravel. Some of these deposits have been dredged for commercial purposes. The base of all but two of the islands (Eureka and Letart whose bases are composed of bedrock) in the study reach is composed of sand and gravel capped with sediments deposited by flooding. Commercial sand and gravel operations (instream and land-based) also occur throughout the study reach.

There are two major sources of groundwater in the study area. Most of the groundwater immediately adjacent to the Ohio River is recovered via induced river discharge from the glacial deposits over which the Ohio River flows. The second source is found in the bedrock beneath the alluvial deposits and soils. Eureka, Middle, Neal, and Blennerhassett Islands have established water wells for industrial and municipal use. Gas, oil, and salt brine are also recovered from the underlying bedrock. For example, many islands contain the remnants of some old oil drilling operations. Gas/oil operations are presently confined to the low terrace and floodplain of the study reach, primarily in the Willow Island and Belleville navigation pools.

The immediate floodplain and all of the islands have flooded numerous times, as evidenced by extensive sediment layers over their sand and gravel cores; however, the extent and frequency of flooding on the Ohio River has been reduced by numerous tributary and headwater reservoirs.

It is important to note that the Ohio River is a greatly altered ecosystem, impounded for navigation purposes. The altered hydrology has affected significantly the quality of both aquatic and terrestrial habitats. Many islands, shallow gravel bars, riffles, and channel wetlands have been lost, and have been replaced by deepwater habitats. Impoundment of the river and resulting elevated water table has altered the plant community composition of the riparian corridor - favoring a silver maple dominated forest.

## *Air Quality*

Most areas of the Refuge and the surrounding lands currently meet federal air quality standards for the six "criteria pollutants", which are ozone, carbon monoxide, sulfur dioxide, particulates, lead, and nitrogen oxides. Nonattainment areas (defined as an area that does not meet national primary or secondary ambient air quality standards, or that contributes to ambient air quality in a nearby area that does not meet standards) are located in Beaver County, Pennsylvania (part of the Pittsburgh-Beaver Valley ozone nonattainment zone) and in Boyd County, Kentucky.

There are no Class I areas (i.e., where air quality standards are stricter because of outstanding visual resources) near any portion of the Refuge. The Refuge is designated as a Class II area, and is protected under the Clean Air Act. It is identified for less stringent protection for air pollution damage than a Class I area, except in specified cases. Hundreds of other airborne chemicals may be toxic or hazardous, but are not subject to ambient standards under state or federal law.

### **Nonattainment Areas**

City/State	County	1-hour O <sub>3</sub>	CO	SO <sub>2</sub>	PM <sub>10</sub>	Pb	NO <sub>2</sub>
Pittsburgh, PA	Allegheny	X		X	X		
Wheeling, WV	Ohio						
Parkersburg, WV	Wood						
Huntington, WV	Cabell						
Ashland, KY	Boyd			X			

## **Biological Environment**

The Service classifies the islands and associated aquatic, wetland, and bottomland habitats as Resource Category 1 under our Mitigation Policy. By definition, the island habitats are of high value for the evaluation species and are unique and irreplaceable on a national basis or in an ecoregion section. Aquatic habitats associated with the islands and their back channels comprise less than one percent of the open water acreage of the Ohio River in the study reach. However, these areas provide some of the region's highest quality riverine, wetland, and bottomland habitats and are used by migratory and resident waterfowl, shorebirds, songbirds, raptors, wading birds, warmwater fishes, and freshwater mussels. Because there is no longer any glacial transport of sand, gravel, cobble, and boulders which formed the islands, and because of the current navigation system, new islands will not be created. For the same reasons, there will be no significant natural maintenance of existing islands. They are irreplaceable.

### *Terrestrial Habitats*

Along the floodplains of the Ohio River in this region, bottomland hardwood forests are the natural climax community. Much of this habitat type has been eliminated by industrial, residential, and agricultural development. The remaining riparian area is often less than a few hundred feet in width. This habitat type has the classic four layered plant structure. Dominant

tree species in the overstory are silver maple, sycamore, cottonwood, and black willow; minor trees include slippery elm, pin oak, river birch, sweet gum, and hickories. Representative species in the lower canopy include: hackberry, black locust, American elm, green ash, box elder, pawpaw, buckeye, and black walnut. Shrubs include spice bush, Virginia creeper, poison ivy, dogwoods, black elderberry, and grape species. Herbaceous density and diversity of ground cover varies with the amount of light penetration. Typical ground cover includes wingstem, touch-me-nots, white snakeroot, and a profusion of invasive exotic plants (Japanese knotweed, garlic mustard, mile-a-minute, Japanese hops, and kudzu).

This floodplain forest community provides good habitat for furbearers such as beaver and cavity nesting species such as wood duck, pileated woodpecker, prothonotary warbler, fox squirrel, and raccoon. It also provides the proper canopy structure and insect life required to support other migratory songbirds like the warbling vireo, yellow-billed cuckoo, northern oriole, over 25 species of warblers, and many species of bats. Mature trees provide roosting and nesting habitat for piscivorous birds, such as osprey, bald eagle, and herons. Understory provides habitat for species such as white-footed mice, white-tailed deer, Carolina wren, and wood thrush. Because these areas are often interspersed with aquatic habitat types, they are of immense value to wildlife.

The other major terrestrial habitat type occurring throughout the planning area is oldfield. Very little active agricultural lands occur within the acquisition area. The early successional habitats were farmed, grazed, or otherwise disturbed in the recent past by oil and gas activities, recreational development, logging, and abandoned industrial sites. These fragmented oldfield habitat blocks are comprised of mostly herbaceous species and grasses (goldenrods, mustards, thistle, reed canarygrass, bindweed, ironweed, joe-pye weed, ragweed, asters, and pokeweed) with some woody species beginning to take hold (blackberry, raspberry, rose, false indigo, dogwoods, and black elderberry). Numerous mammals (white-tailed deer, cottontail rabbit, ground hog, deer mouse, meadow vole) and migratory birds (American goldfinch, sparrows, yellow-breasted chat, swallows, blue-winged warbler, common yellowthroat, willow flycatcher, northern harrier, and owls) use this habitat type.

The riparian edge/shoreline areas along the islands provide important habitat for a number of wildlife species dependent on this limited habitat type, such as belted kingfisher, spotted sandpiper, bank swallows, killdeer, mink, muskrat, river otter, and a variety of amphibians, reptiles and insects (including some rare species of tiger beetles).

There are a total of 40 islands remaining in the upper Ohio River. Twenty islands are part of the Refuge at the present time. These island habitats contain near natural assemblages of plants and animals that are endemic to the river. The interspersed bottomland and riparian habitats, and deep and shallow water aquatic habitats makes these areas extremely valuable to fish and wildlife species. Waterfowl, shore and wading birds, raptors, neo-tropical migratory land birds, furbearers, fish and benthic organisms, including freshwater mussels, find these areas invaluable for resting, feeding, nesting, spawning, and other necessary life functions. The deep and shallow water habitats associated with the islands are major fish and mussel production areas of the Ohio River. Additionally, the often undisturbed island shorelines, especially the heads and backchannels, are favored sport fishing areas. Over 200 bird species (76 of which breed there),

42 mollusk species, 15 species of reptiles and amphibians, 101 species of fish, 25 mammals, and 500 species of plants have been identified so far within the Refuge.

### *Wetland Habitats*

Prior to impoundment, the Ohio River was a relatively shallow river (the average depth in summer was less than one foot), with numerous islands, gravel bars, channel wetlands (riverine emergent, and riverine aquatic bed), and adjacent overflow sloughs surrounded by bottomland hardwood forests. Impoundment of the river for navigation interests has created primarily deepwater habitat along the main channel corridor (average depth in channel 20 to 30 feet, with a maximum of 50 feet) and many islands, shallow bars, and channel wetlands have disappeared. Most of the remaining shallow water and wetlands in the floodplain occur in the embayments - the drowned tributary mouths inundated by backwaters from the impounded Ohio River. Think of the embayments as "displaced wetlands," situated off the main channel and up into the tributaries.

Major wetland habitat types and dominant plant species (if any) in the embayments and along the mainland wetlands include:

- **riverine open water** (deep water, mudflats, and exposed cobble/gravel);
- **riverine emergent** (water willow, American lotus, lizardtail, bullhead lily, arrowhead, horsetail, arrow arum, yellow iris);
- **riverine aquatic bed** (water celery, pondweeds, milfoils, duckweed, Elodea sp., coontail, naiads);
- **palustrine open water** (deep water and mudflats, cut-off from flow);
- **palustrine emergent** (smartweeds, wild millet, cattail, sedges, rushes, sweet flag, bulrushes, wild rye, rice cutgrass, false nettle, spike rushes, swamp milkweed, sensitive fern, swamp rose mallow, burreed, marsh purslane, monkeyflowers, vervains, spotted and pale touch-me-nots, boneset, cardinal flower, begger-ticks, loosestrife, seedbox, bedstraw, bugleweed, water horehound, tickseed sunflowers, black elderberry, St. Johnswort, moneywort, ditch stonecrop, primrose willow, and dodder);
- **palustrine scrub/shrub** (black willow, brookside alder, buttonbush, dogwoods, false indigo, sandbar willow, swamp rose); and,
- **palustrine forested** (black willow, eastern cottonwood, sycamore, slippery elm, silver maple, American elm, river birch, green ash, pin oak, hackberry).

In the Refuge planning area, there are approximately 5,500 acres of relatively undisturbed embayments and mainland wetlands affected by the Ohio River backwaters which have some significance to fish and wildlife. The physical characteristics and values of the embayments vary throughout the years and seasons. In summer, during the height of the growing season, the

diversity of wetland plants and habitat types provide excellent food and cover for migratory and resident wildlife. The shallow water habitats are important feeding areas for wading birds such as great blue herons, great egrets and black-crowned night herons - especially for those which nest in rookeries nearby and feed in the embayments while raising their young. After fledging, juvenile herons concentrate in the embayments as well. Wood ducks, mallards, and Canada geese raise their broods in the embayments and along the mainland wetlands in summer. Young-of-year fishes find shelter in the riverine aquatic bed and emergent wetlands. The embayments are important nursery areas for Ohio River fishes, particularly bass and sunfish. The embayments also support an abundance of amphibians and reptiles (snapping turtles, spiny-softshell turtles, painted turtles, map turtles, northern water snake, bull frog, leopard frog, green frog, pickerel frog, grey tree frog, spring peeper, fowler's toad, American toad), as well as at least 19 species of mussels.

Fall generally brings lower water levels in the embayments, exposing mudflats and invertebrates as well as aquatic plants to feed migrating shorebirds, wading birds and waterfowl. Native wildlife food plants such as smartweeds, bulrushes, wild rye and millet lie down and become available to migratory birds and other wildlife. Soft mast-producing trees and shrubs dominate in the embayments (elderberry, cherry, spicebush, hackberry, grape, dogwoods), providing abundant food for migratory landbirds en-route to their southern destinations.

During the winter, the emergent wetland vegetation in the embayments lays down and dies back, but much submerged aquatic vegetation and rootstocks remain as important food for wintering waterfowl and muskrat. While high water and swift currents are common on the main river in winter, the embayments provide quiet resting places off the main river for fish and wildlife to conserve energy. Over 25 species of waterfowl (ducks, geese, swans, mergansers) and other waterbirds (loons, grebes, and gulls) rest and feed in the embayments in winter as long as they remain ice-free. Bald eagles are more abundant in winter than at other times of the year along the river and in the embayments, as they shift south off frozen lakes and rivers in the north, and find abundant food and occasional large roosting trees along the river.

Spring comes to the embayments earlier than the main river, as the shallow waters warm up faster. Those bottomlands which were flooded in winter "green up," and exposed mudflats again nourish migrating shorebirds and wading birds. Herons and waterfowl begin to nest as early as March. Neotropical migratory landbirds also return to nest, including warblers, thrushes, vireos, cuckoos, flycatchers, and tanagers. Many more species pass through on their journey back to their northern breeding range, stopping and feeding on late fruits, early seeds, and abundant insects.

### *Aquatic Habitats*

The sand, gravel, and cobble beaches which typify most of the islands are good indicators of the river substrates which extend from the islands down into the depths of the river. Different substrate types are associated with the islands, including sand, gravel, cobble, boulder, emergent and submerged stumps and logs, other detritus, silt, clay, muck, and emergent and submerged riverine aquatic beds. The substrate type in a particular location is a function of the current velocity and current pattern. Sand, gravel, and cobbles are predominately associated with island

heads and shorelines where high current velocities keep these coarser substrates swept clean of the fine materials. With the exception of those areas which lie directly downstream of locks and dams, the heads of the islands more closely resemble a natural riffle/run habitat which was a major characteristic of the Ohio River prior to impoundment.

During those years when environmental conditions are suitable, large expanses of submerged aquatic beds extend along the shorelines of the islands, out to a depth of approximately four feet. Shorelines along an inside bend, backchannel shorelines, and toes of islands are usually a combination of softer substrates-sand, silt, clay, and detritus. Submerged and emergent logs and stumps may accumulate in depositional areas.

In general, the aquatic habitats adjacent to and surrounding the islands are dominated by hard substrates (gravel, cobble, and boulder). At the present time, over 100 species of fish and over 40 species of native freshwater mussels inhabit the aquatic habitats adjacent to the island Refuge. The backchannel habitats of the islands (approximately 1,500 acres) have a greater degree of protection from natural and human induced disturbances, such as erosive currents, wind, and commercial navigation.

### *Fish and Wildlife*

A complete listing of all birds, freshwater fishes, mollusks, mammals, reptiles, amphibians, and flora known to exist within the Refuge's study area are listed in Appendix D. These listings include: the family that each identified species belongs to; scientific names and common names; the current status of the species; and whether or not the species is native to the area.

The **birds** of the Refuge are probably the most conspicuous group of wildlife, in terms of their numbers, visibility, and overall diversity of species. Over 200 species of birds have already been recorded using the Refuge at some time during the yearly cycle of seasons (Appendix D). The Refuge provides different habitat requirements for birds at different times of the year. By and large, the most abundant group of birds are migrants (143 species). These are birds which spend part of the year elsewhere, but come to the Refuge either to breed in the summer, spend the winter, or merely pass through (feeding and resting) during the spring and fall. Only 44 species of birds are considered year-round residents on the Refuge, and six species are "accidental tourists."

Migratory landbirds (such as warblers, vireos, cuckoos, tanagers, thrushes, orioles, and flycatchers) spend the winter in Central or South America but migrate up through the Ohio River Valley in spring en route to their breeding grounds, either on the Refuge or points farther north. Many go as far north as Canada and the Arctic, and then back south again in the fall. The Ohio River corridor is poised on the boundary between the Atlantic and Mississippi flyways, and is a major migration route for birds. **Migratory birds** are the dominant breeding birds on the Refuge. To date, 78 species are known to nest on the Refuge, and the most abundant nesters include grey catbird, wood thrush, song sparrow, yellow warbler, common yellowthroat, northern cardinal, yellow-breasted chat, American robin, common grackle, acadian flycatcher, Carolina wren, red-eyed vireo, American redstart, Carolina chickadee, Eastern towhee, American goldfinch and

white-eyed vireo. **Of the 20 species of concern identified by the West Virginia Partners in Flight team, 15 are known to nest on the Refuge.**

**Water birds** heavily use the floodplain habitats of the Refuge. Herons, egrets, ducks, geese, swans, loons, grebes, gulls, terns, shorebirds, osprey, and bald eagles are common along the islands and in the embayments, and are much more easily seen out in the open than some of their smaller and more secretive colleagues. Nesting water birds include great blue heron, green heron, osprey, wood duck, mallard, American black duck, Canada goose, killdeer, spotted sandpiper, belted kingfisher, and herring gull. The remaining species of water birds are found on the Refuge during migration, or, in the case of most waterfowl (25 species) and the bald eagle, primarily in the winter. The Refuge monitors the nesting activities of osprey and great blue herons on the Refuge. The mean number of osprey young hatched since 1995 on Neal Island is 2.5, and the average number of young fledged is 2.0. Great blue heron rookeries occur on Grape, Fish Creek and Muskingum Islands, and are expanding onto mainland areas and new islands. In 1992, there were 245 active heron nests on two islands, and the average number of young fledged per nest was 2.3. In 1999, there were 200 nests spread out among four islands.

Many **raptors** on the Refuge are year-round residents, such as the great horned owl, eastern screech owl, barred owl, red-tailed hawk, cooper's hawk, sharp-shinned hawk, American kestrel, broad-winged hawk, and red-shouldered hawk. Other birds of prey visit the Refuge only during migration or winter, such as the merlin, peregrine falcon, northern harrier, and rough-legged hawk. There is an abundance of small mammals and birds which serve as food for the raptor populations.

To date, 25 species of **mammals** have been documented on the Refuge (Appendix D). The general hydrologic characteristics of the islands, which includes regular flooding, dictate that ground-dwelling mammals must be primarily transient in nature (in other words, good swimmers), or able to climb trees. The most commonly observed mammals include white-tailed deer, fox squirrel, raccoon, muskrat, beaver, opossum, red fox, woodchuck, and eastern cottontail rabbit. The larger mammals are seen frequently swimming back and forth between the islands and the mainland. The small mammal populations include five species of bats, meadow vole, short-tailed shrew, meadow jumping mouse, white-footed mouse and deer mouse. Riparian fur bearers, such as mink, muskrat and beaver, are noticeably more abundant along the back channels and wetland habitats of the embayments than along the main channel/navigation sides of the islands.

The distribution of mammals on the Refuge is heavily influenced by habitat type. Nearly 60% of the Refuge is now bottomland hardwood forest (up from 38% in 1981). As the habitats change, the mammal populations will respond with a shift towards the forest community and away from the old field community. Although most of the mammals are considered residents, bats in particular migrate long distances from their winter hibernacula in caves to their summer range along the Ohio River. The endangered Indiana bat has been documented in riparian forests adjacent to the Refuge, within Wayne National Forest.

Due to problems with access, the **reptile and amphibian** fauna of the Refuge has not been well studied. Existing information for herpetofauna is merely presence or absence on a county basis,

with no information on relative abundance. To date, Refuge staff have documented 15 species of reptiles and amphibians on the Refuge, but this information is merely a beginning (Appendix D). The wetland habitats on and around the islands, and within the embayments and mainland wetlands, provide suitable habitat for a variety of amphibians, including American toad, Fowler's toad, green frog, bullfrog, gray tree frog complex, northern spring peeper, pickerel frog, and northern leopard frog. No salamander information is available.

Snakes in general are not abundant on the islands, primarily because of the tendency of the islands to flood regularly - snakes which might den or overwinter on the islands would probably not survive a winter flood event. However, the occasional garter snake or black rat snake is seen on the Refuge, and northern water snakes swim to and from the islands.

Four species of turtles have been recorded on the Refuge so far - the terrestrial eastern box turtle, and the more aquatic snapping turtle, midland painted turtle, and eastern spiny softshell turtle.

Over 100 species of warm water fishes inhabit the Ohio River which flows through the Refuge (Appendix D). The islands provide a variety of habitat types for the diverse **fish** fauna - shallow gravel and sand bars, aquatic beds, overhanging cover, logs and snags, as well as large rock and cobble. Riverine emergent and submerged wetlands teem with young-of-year fishes. However, the deep water habitats are very difficult to sample effectively. Fishes are sampled primarily by State Natural Resource agencies in lock rotenone surveys, nearshore electrofishing, and shallow water seining. Many pelagic fishes and those which dwell in deep water along the bottom are often missed. Refuge divers have noted numerous species of darters, minnows, and madtoms in 20 feet of water, yet they are hard to collect.

The Ohio River along the Refuge supports a diverse recreational fishery, highlighted by spotted, smallmouth and largemouth bass, white and hybrid striped bass, channel and flathead catfish, sauger, walleye, black and white crappie, and freshwater drum. There is currently no commercial fishery in the Ohio River adjacent to West Virginia, Ohio or Pennsylvania.

**Mollusks** on the Refuge include **freshwater mussels** (the most diverse group), aquatic snails, and terrestrial snails. There are currently 50 species of freshwater mussels remaining in the Ohio River today, and 38 of these have been collected on the Refuge so far (Appendix D). Historically, there were upwards of 80 species in the free-flowing Ohio River, but habitat changes over the past 100 years have resulted in the extinction of at least 3 species, and the extirpation of many more. In addition to the habitat and water quality problems which mussels have faced, add the new threat caused by the invasion of the exotic zebra mussel. Zebra mussels first entered the Refuge in 1993, and since that time, their density has exploded to 13,000 animals per square meter. Zebra mussels compete with native mussels for food and oxygen, interfere with their reproduction, and encrust native mussels so heavily that the native mussels cannot open and close their shell, burrow, or move effectively. It's easy to see why freshwater mussels are the most imperiled group of animals on the Refuge.

Every Refuge island has been surveyed at least once, and each one has some mussel fauna associated with the underwater habitat surrounding it. At least two federally endangered mussels occur on the Refuge (pink mucket and fanshell) in the Belleville, Racine, RC Byrd, and Greenup

pools. The most diverse mussel bed is found at Muskingum Island, with 28 species and an average density of 12 live mussels per square meter. Mussels generally require clean-swept sand, gravel, cobble and boulder habitat, and well oxygenated and nutrient rich waters. These habitats are abundant around the islands.

Commercial harvest of mussels (primarily for the cultured pearl industry) is generally permitted in Kentucky waters, but not in the states of Pennsylvania, Ohio or West Virginia. However, there are sanctuaries in place adjacent to the Kentucky Refuge islands which prohibit commercial harvest from those areas.

The snail fauna of the Refuge are not as well known as their bivalve cousins. Two species of terrestrial snails have been found on the Refuge so far, and their distribution is restricted to islands. The aquatic snails in the upper Ohio River are not as diverse as in the lower 500 miles, and those that remain are impacted by the zebra mussel as well.

#### *Rare, Threatened, and Endangered Species*

Four federally listed species are known to inhabit the Refuge planning area: bald eagle, Indiana bat, pink mucket pearly mussel, and fanshell mussel. The bald eagle is most common during the winter months (November through March), but some have been seen throughout the summer. The Indiana bat spends winters in cave systems far from the Refuge, but inhabits the Ohio River in summer. The pink mucket and fanshell mussels, on the other hand, are year-round residents in the riverbed.

Numerous species of flora and fauna occur on the Refuge which are considered rare, threatened, endangered, or of special interest by the states of Pennsylvania, West Virginia, Ohio and Kentucky. Appendix D contains complete lists of plants and animals documented thus far on the Refuge, along with their current status under federal or state guidelines. At the present time, the Ohio River Islands Refuge is home to 45 species of special status birds, 33 special status fish, 31 special status mollusks, six species of special status terrestrial vertebrates, and 39 species of rare plants.

The peregrine falcon (*Falco peregrinus*) (formerly listed as endangered) has recently expanded its range and migrates through the Ohio River Valley in fall and spring. In August 1999, the Service removed the peregrine falcon from the list of endangered and threatened species, removing protections provided to the species. However, section 4(g)(1) of the Endangered Species Act requires implementation of a monitoring program for a minimum of five years. The Service has decided to monitor the peregrine falcon for 13 years, to provide data that will reflect the status of at least two generations of peregrines. If it becomes evident during this period that the peregrine is not maintaining its recovered status, the species could be relisted. The peregrine continues to be protected by the Migratory Bird Treaty Act, which prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except when specifically authorized by the Department of the Interior.

#### **Socioeconomic Environment**

The largest cities along the Ohio River's banks are Pittsburgh, Pennsylvania; Cincinnati, Ohio; and Louisville, Kentucky. All three of the cities grew in the 1800s, largely through use of the river as a transportation route. Today, the river remains an important commercial artery. In 1999, the Port of Pittsburgh was ranked the 11<sup>th</sup> largest port in the United States and the largest inland port in the country. Most shipping today is of bulk products, primarily coal, which is mined in all of the states bordering the Ohio, loaded onto barges near the mines, and carried to electricity-generating plants along the river. Gravel and petroleum products are also transported.

Many of the larger (and more visited) islands in the Refuge's boundary are clustered around the Parkersburg, West Virginia and Marietta, Ohio area. The counties of these two cities (Wood County and Washington County, respectively) comprise the metropolitan area of over 149,000 people.

### *History/Archaeology*

A 1998 geological and archeological assessment of the Ohio River Islands Refuge was able to classify the islands into three general types:

- Islands with sediments having recent origins not likely to contain prehistoric archaeological sites;
- Islands with Holocene sediments likely to contain historic artifacts close to the surface and deeply buried prehistoric sites; and
- Islands which contain a core area of Pleistocene sediments, overlaid by shallow Holocene age sediments which are likely to contain prehistoric and historic resources closer to the surface (Diamanti 1998).

The processes of island formation have direct implications for the potential of archaeological resources within the soils of the Refuge islands. Because we now understand the processes that formed the islands within the Refuge area, we can better manage archaeological resources and better predict which islands are more likely to have archaeologically sensitive areas. Island formation is also relevant to what kinds of prehistoric sites could exist on the individual islands. For example, if an island only contains late Holocene sediments (i.e. 4,000 years before present (BP) to present), then Paleoindian and Early Archaic sites would not exist on that island. [More detailed information on the archeology of the area can be found in Appendix B.]

While French and British fur traders frequented the valley in the 18th century, the first extensive Euro-American settlement in the Ohio River valley began around 1790. The search for good agricultural land was the major impetus to westward migration and lands suitable for cultivation were quickly claimed. Farm products such as grain, tobacco, livestock and distilled liquor were the first produced for market. Settlement progressed rapidly in some areas and the population became sufficient in 1803 for Ohio to achieve status as America's seventeenth state.

The river was the major route for transportation of goods and inflow of settlers. Taverns and mercantile exchanges were established along the shore. River pirates occupied some of the region's many islands, preying upon travelers and slow-moving steamboats. Shallow fords between some islands also enabled some African slaves to escape to the free soil of Ohio. They

were also used by participants of the Battle of Buffington Island, during Morgan's retreat to West Virginia.

Throughout the nineteenth century, the region felt the afflictions of the Civil War and the development of the Industrial Revolution. In the twentieth century, the Ohio River itself was transformed by human engineering. The level of the river has been raised by a set of locks and dams. The fords and portions of the Refuge islands that were above the water during the prehistoric and early historic periods are now inundated.

The islands figure prominently in the early explorers' accounts of prehistoric and contemporary Indians, George Washington's surveying expeditions, the settling of the Ohio River by pioneers and traders, strategic battles during the Civil War, and river exploitation for navigation and industry. Islands were once more numerous than they are today. In the early 1900's, there were 60 islands within the planning area (437 miles). With the advent of industrialization and modern improvements for navigation, 20 islands were lost and, apparently one (Lesage Island), was created:

### **Ohio River Islands in the Planning Area No Longer Existent**

Line Island	Deadman's Island
Baker Islands	Crow Island
Cluster Island (one of two remain)	Hog Island
Black Island	Montgomery Island
Pike Island	Mingo Island
French Island	Clines Island
Willow Island	Six Mile Island
Belleville Island	
Goose Island	
Oldtown Island	
Letart Island (one of two remain)	
Raccoon Island	
Upper Sister Island	

At least four islands were modified by natural forces. Grape and Bat Islands were "fused" through sedimentation. A palustrine wetland complex now exists within the area between the two islands. The island complex is called Grape Island but some references are noted as Grape (Bat). Goose Island, formally located between mile 230 and 231, apparently disappeared through sedimentation and a shift in the flow direction of Mill Creek. Upper Brothers Island, or French Island, may have experienced the same fate. Of the 40 existing islands between Pittsburgh - Pennsylvania (mile 0) and Meldahl Dam (Mile 437), five have been heavily urbanized and/or industrialized (Brunot, Davis, Neville, Wheeling, and Browns). Boggs Island has been extensively disturbed in recent years.

## *Land Use*

Islands in the Ohio River have been and are currently used for a variety of purposes. The acreages associated with lands owned by the Refuge was shown in Chapter 1 (Figure 2). Acreages associated with the remaining islands, but not owned by the Refuge, is shown in Figure 3. Evidence of past Indian encampments, farming, logging, commercial dredging, mooring, construction, and oil drilling may be found. Indian artifacts and middens were observed on most of the islands. These islands were undoubtedly inhabited by Indians attracted by the rich farmland and plentiful fish and game. Agriculture and silvicultural activities occurred on all islands. Commercial dredging, mooring, or other construction has taken place around most of the islands. Belleville, Pike, Montgomery, and Willow Islands were eliminated by construction of their respectively named high-lift navigation dams. Oil drilling and loading operations are evident on Mill Creek, Grandview, Wells, and Muskingum Islands.

Evidence of past agricultural use can still be seen on Williamson, Middle, Marietta, and Neal Islands. No recent silvicultural operations are known. No active human residences are maintained on any of the islands. The head of Blennerhassett Island is maintained as a major historical and recreational attraction by the State Historic Park Commission. Past industrial activities include: water wells (Eureka, Neal, Blennerhassett), gas/oil and water wells (Middle), stockpiling (Williamson), spoil disposal (Manchester No. 1, Boggs), commercial sand and gravel dredging (potentially all), and mooring (Williamson, Eightmile, and Boggs). All of the islands have been threatened by sand and gravel dredging operations.

## *Recreational Use*

The Ohio River, its islands and embayments, offer a wide range of outdoor settings, from relatively secluded areas to the bustling interface of towns and cities. Recreational use reflects seasonal opportunities and locations for specific activities. Some of the most popular public uses currently include fishing, pleasure boating, water-skiing, beach use, wildlife observation, and hunting. Gradual improvements in water quality and public access have helped create an atmosphere of increased interest in the river. However, many people remain skeptical about engaging in activities that bring them into direct contact with the water.

<b>Parcel Name</b>	<b>Land</b>	<b>Underwater</b>	<b>Total</b>
<i>Babbs Island</i>	38.1	66.2	104.3
<i>Cluster Island</i>	17.2	146.4	163.6
<i>Upper Griffen Island, and Lower Griffen Island</i>	7.3	205.3	480.9
<i>Browns Island</i>	3.9		
<i>Browns Island</i>	264.4		
<i>Upper Twin Island, and Lower Twin Island</i>	2.9	125.3	142.8
<i>Upper Twin Island</i>	14.6		
<i>Boggs Island</i>	14.6	56.9	71.5
<i>Fish Creek Island</i>	48.3	86.4	134.7
<i>Eureka Island</i>	24.7	65.3	90.0

<i>Vienna Island</i>	33.7	60.4	94.1
<i>Blennerhassett Island</i>	515	215.6	730.6
<i>Newberry Island</i>	5.3	58.7	64
<i>Mustapha Island</i>	25.3	101.5	126.8
<i>Eightmile Island</i>	18.2	104.4	122.6
<i>Gallipolis Island</i>	5	70.5	75.5
<i>Lesage Island</i>	20.5	--	20.5
<i>Brush Creek Island</i>	25	146.6	171.6
<b>SUBTOTAL FOR</b>			
<b>NON-REFUGE ISLANDS</b>	1,084.0	1,509.5	2,593.5

About two-thirds of the area's fishing takes place at dam tailwaters, although many islands and embayments offer productive fish habitats that also attract anglers. Sedimentation in embayments and an apparent decrease in non-native largemouth bass in the upper river in recent years have generated concern from bass anglers and organizations sponsoring bass tournaments. Nevertheless, fishing use levels remain relatively steady since the Ohio Division of Wildlife conducted surveys in 1992 and 1993. At that time, fishing pressure for a 491-mile stretch of river was estimated at 2.5 million angler hours for both years. Some popular game species include the black basses, white bass and hybrids, catfish, crappie, walleye and sauger. Fishing occurs during the daytime and at night on the river.

Pleasure boating, including the use of jet skis, and water-skiing are increasing in popularity, with some access areas congested during summer weekends. Parking areas have been expanded or improved at ramps such as in Belpre, Ohio and Paden City, West Virginia. Although most recreational boaters do not lock through from pool to pool when on the river, recreational boat locking data collected at the Willow Island locks reflects an increasing use trend of boats on the river:

**Year (#) of recreational boats locking through at Willow Island**

**1993 1486**

**1995 1391**

**1996 1348**

**1998 1688**

**1999 1820**

Some of the boating on the Refuge is incidental to travel required to go from one place to another, but potential impacts to Refuge resources can occur as noise and visual disturbance to wildlife and erosive wave action. Other boaters specifically use the Refuge as a place to temporarily moor while engaging in beach activities such as picnicking, swimming, and sunbathing.

Sandy beaches flank many of the river's islands, particularly on sides facing navigation channels. Illegal uses of the beaches have decreased markedly on some Refuge islands such as Phyllis, Paden, Williamson, Grape, and Manchester #2 during the past five years, as evidenced by staff observations and vegetation growth. Although these are not Refuge priority public uses, the information signs posted on the island and the Refuge brochure states that picnicking, swimming, and sunbathing are among those activities that are currently permitted. Future uses on Paden and Williamson Islands could increase in the future due to increased development, such as campsites, nearby. Beaches also occur along the mainland shores, but many of these areas are privately owned or largely unavailable to visiting recreationists.

Participation in activities such as wildlife observation and photography are becoming more popular on the river. Bird watching tours are chartered with at least one commercial sternwheel service. The varied habitats on the river and its islands and embayments and the wildlife response to improved environmental conditions offer the potential for growth in this type of recreation.

Designated sites for wildlife watching are limited, although the Refuge has two "Watchable Wildlife" sites described in the West Virginia Viewing Guide (one on road-accessible Middle Island, and the other on boat-accessible Muskingum Island). A wildlife viewing blind and trail were developed on Middle Island in 1999, providing a targeted area for this activity.

Hunting opportunities draw hunter interest to the river for white-tail deer, waterfowl, and small game such as rabbits and squirrels. Refuge purchase of islands has expanded hunting opportunities for the public. Islands once closed to all hunting or limited to a landowner and those with special permission now provide the same access to everyone. Some Refuge islands currently remain closed to hunting because of safety issues (usually related to proximity to developed portions of the mainland). Archery deer and waterfowl hunting receive the most participation, and are increasing with additional Refuge property acquisitions, although pressure remains light.

Environmental education opportunities are increasing on the river, both on the Refuge and off. Refuge staff have worked with educational interests in Marietta, Ohio and in West Virginia to meet some of the demand.

## **Management Direction**

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. A requirement of the Refuge Improvement Act is to maintain the ecological health, diversity, and integrity of refuges. The refuge is a vital link in the overall function of the ecosystem. To offset the historic and continuing loss of riparian and forested floodplain habitats within the ecosystem, the refuge helps to provide a biological "safety net" for migratory non-game birds and waterfowl, threatened and endangered species, and other species of concern.

The goals of Ohio River Islands National Wildlife Refuge translate the stated Refuge purpose into management direction. To the extent practicable, each goal is supported by measurable and achievable objectives with strategies needed to accomplish them. Objectives are intended to be accomplished within 15 years, although actual implementation may vary as a result of available funding and staff.

One table at the end of this chapter summarizes the management direction (Figure 4), while another summarizes the potential consequences of implementing it as related to the identified issues (Figure 5).

### **Refuge Management Direction: Goals and Objectives**

This plan combines increased management actions that address habitat, fish and wildlife, and public use needs, and proposes staffing levels and facilities which are adequate to do the job. We have aspired to reflect a balanced approach to management, with greater focus on compatible wildlife-dependent uses, ecosystem priorities, and restoration and conservation of biodiversity.

**Goal 1: Preserve and restore wetland, riverine and riparian habitat in order to maintain a natural abundance and diversity of native species which are endemic to the Ohio River floodplain (with emphasis on trust resources, endangered and threatened species, and other species of concern).**

#### *Discussion*

The major habitat problems which plague the islands are erosion and the invasion and establishment of exotic plants (i.e., Japanese knotweed, sachaline, purple loosestrife, multi-flora rose, garlic mustard, honeysuckle, mile-a-minute, and other exotics). Habitat management on the Refuge will emphasize the diversity and abundance of fish and wildlife species that are

characteristic of the Ohio River floodplain. Historic wetlands will be restored on Refuge lands and on adjacent or nearby private lands through willing cooperation with other landowners. Bottomland hardwood forests will be restored through native tree plantings and exotic species control. Tree plantings include native floodplain species such as: pin oak, swamp white oak, black walnut, butternut, buckeye, black willow, shumard oak, American chestnut, hickories, black cherry, American plum, persimmon, cottonwood, hackberry, green ash, and sycamore. In addition, spice bush, pawpaw, dogwood, and other native berried shrubs are being planted to increase habitat and structural diversity. There will also be natural openings in the forest. Eroding shorelines will be stabilized using longitudinal dikes of vegetation or hard material (logs, rock, etc.). Coordination with the U.S. Army Corps of Engineers will be necessary for placement of material in river, and the Refuge will submit pertinent applications at the appropriate time.

Bottomland hardwood forest is the principal habitat targeted for restoration because it is the most important and limited habitat type in the area. Prior to colonial settlement and the westward expansion, the Ohio River was a free-flowing, relatively shallow river with numerous islands, gravel bars, channel wetlands, and adjacent overflow sloughs and oxbows surrounded by bottomland hardwood forests. Much of the floodplain has been settled, cleared, drained, farmed and developed, resulting in the outright loss of habitat and the fragmentation of that which remains. Between 1800 and 1970, approximately 1,235,000 acres or 65% of the forested floodplain habitat was lost or converted to other uses (Ohio River Basin Commission, 1978). These losses have reduced habitat for many species of fish and wildlife, including federally and state listed species which depend on intact floodplain forest. Of the 20 species of birds on the West Virginia Partners in Flight Priority list, 16 of them are birds of principally forested habitats (WV Partners in Flight, 2000), which regularly use the floodplain of the Refuge.

The Ohio River Ecosystem Restoration Study Report identifies a number of restoration strategies and opportunities, including the restoration of 25,000 acres of bottomland hardwood forest and 25,000 acres of wetlands (U. S. Army Corps of Engineers, 2000). All of the resource agencies from states adjacent to the Ohio River participated in development of the resource issues, restoration goals and opportunities. The Refuge is contributing toward riverwide environmental restoration objectives by its active reforestation and wetland restoration efforts.

Most of the targeted wetlands for restoration are riverine wetlands. Restoration of riverine wetlands (submerged and emergent) involves stabilization of shorelines (to catch failed soils and disperse boat wake energy), direct planting of some species and "volunteering" of others where seed or rootstock is already present in the system. While we will not limit ourselves to average only two acres per year, many of these riverine wetlands are narrow, linear features which require much effort to gain two acres overall.

Although the refuge has no direct control of water levels in the river, it will advocate to the Corps of Engineers the resource benefits to be gained by water level management which mimics natural hydrological cycles. In addition, the refuge will cooperate with local landowners and other partners to improve habitat conditions in the watershed, which will benefit the habitat quality of the river and embayments.

While the Refuge will continue to gather data on exotic species on refuge lands, staff estimate 600 acres of invasive plants already on the refuge, and expect control of this important problem on existing properties within 20 years. Exotic plants will be managed through chemical means (direct application of herbicides), repetitive mowing and cutting where applicable, and, if available, biological control.

Wildlife management activities will include re-introduction of species which have been extirpated (provided their habitat requirements are met); supporting captive rearing of endangered or imperilled mussels; and control of animals which are creating habitat or public health problems by hunting, trapping and/or deterrence. The re-introduction of extirpated native fish and mussel species will be coordinated with state resource agencies. The Refuge will cooperate with state resource agencies to evaluate which species might be appropriate, whether habitat conditions can be met, if genetics issues need to be examined, and what funding may be required to implement a re-introduction program.

The Service will allow trapping for management purposes, and the Refuge anticipates developing a Furbearer Management plan by 2004. Trapping is well documented as an effective and accepted practice to protect the health and populations of furbearers, and to control certain populations (such as beaver, muskrat, raccoon, etc.) when they become a problem for habitat, other wildlife, or public health (NFRTC 1996). The trapping program will be similar to those of other refuges. Permits for selected areas will be issued to a limited number of participants to meet both habitat objectives and public health and safety concerns. Trappers may be members of the public, clubs, professionals, or even a youth education program.

The Service will erect nesting boxes as an environmental education activity and as a temporary habitat deficiency measure until mature forest habitat occurs. The majority of boxes will be placed at natural densities on those islands lacking mature bottomland hardwoods which are targeted for reforestation.

Land acquisition and protection is a foundation of our National Wildlife Refuge System. Without the appropriate types and amounts of habitat, the numbers of fish and wildlife species would be greatly reduced. Current Service policy is to acquire land only: 1) from willing sellers, as funds become available; and 2) when other means to achieve program goals are not appropriate or effective. The Service's Land Acquisition Priority System (LAPS) will serve as the principal tool for ranking acquisition proposals. The Service's immediate focus will be on the protection and purchase of the remaining islands of interest. We will detail all future land acquisition strategies in a forthcoming Land Protection Plan (LPP) and Environmental Assessment. The LPP will focus on embayment and wetland areas previously identified in the Draft CCP/EA to be considered to add into the Refuge's boundary.

1. Restore an average of 50 acres annually of floodplain forest through plantings of native bottomland hardwoods.
2. Control or eradicate an average of 30 acres of invasive plant species annually through mechanical, chemical, and biological techniques and evaluate their effectiveness.
3. Between 2001 and 2010, acquire or protect (through fee title purchase, donation, or easement) 2,537 acres of remaining islands - Fish Creek, Eightmile, Mustapha,

Gallipolis, Brush Creek, Neal, Newberry, Halfway, Lower Sister, Manchester Island in-holdings, Blennerhassett, and possibly portions of Eureka and Brown.

4. Continue mussel quarantine and support captive rearing program.
5. In coordination with state resource agencies, re-introduce fish and mussel species which have been extirpated from the Refuge.
6. Install, monitor and maintain 80 prothonotary warbler nest boxes, 60 wood duck nest boxes, and 10 butterfly and bat boxes, and evaluate their effectiveness.
7. Install an average of 1 linear mile annually of longitudinal dikes and/or vegetative waddles for shoreline stabilization and re-vegetation.
8. Re-vegetate/restore an average of 2 acres per year of wetland habitat (riverine aquatic bed, riverine emergent and/or palustrine emergent).
9. Where feasible, manage water levels on Refuge wetlands to mimic natural fluctuations, and promote aquatic and wetland vegetation.
10. Using a watershed approach, restore the habitat of selected areas with willing partners, including applicable state, local, and federal agencies.
11. Work with the Corps of Engineers to provide erosion protection and rehabilitation of islands.

**Goal 2: Collect sufficient biological data so that informed management decisions may be made for enhancing or controlling priority wildlife or plant populations.**

### *Discussion*

The principal species of management concern will be migratory birds and endangered species (including mussels). Monitoring studies on the Refuge will concentrate on these groups of wildlife. New surveys will be implemented (if funding and staffing permit) for mammals, reptiles, amphibians, plants, fish, insects and other invertebrates. Habitat conditions will be monitored by interpretation of aerial photography, and "on the ground" monitoring of vegetative responses to management activities. Specific details on the scope of monitoring, techniques to be used, data analysis and reporting will be addressed further in the step-down Wildlife Inventory Plan and Habitat Management Plan. The Refuge will coordinate and share data with state resource agencies, and will welcome receipt of similar data.

1. Continue baseline surveys of new acquisitions, and monitor populations of native mollusks every five years.
2. Annually track the status (e.g., distribution and densities) of zebra mussels and their impact on native freshwater mussels at 10 sites.
3. Survey Refuge properties for the presence of endangered Indiana bats (*Myotis sodalis*) during the summertime.
4. Implement species surveys and inventories for plants, fish, insects, mammals, invertebrates, reptiles, and amphibians on Refuge properties.
5. Conduct cover-type mapping for all Refuge properties prior to the year 2003, and incorporate data into a GIS system.
6. Monitor vegetation response to habitat management.
7. Conduct baseline breeding bird surveys of migratory land birds of concern to determine species richness, relative abundance, and average population densities, and monitor every

- 5 years thereafter.
8. Track annual changes in migratory bird populations and species composition in response to management actions and natural succession by employing breeding bird survey techniques.
  9. Conduct annual mid-winter bald eagle survey (29-mile route in Willow Island Pool).
  10. Monitor osprey nests on the Refuge annually.
  11. Monitor the status of heron rookeries on Refuge properties annually.
  12. Implement annual wood duck banding program (in coordination with applicable state agencies) with a minimum target of 100 birds each year.
  13. Implement a semi-monthly winter waterbird survey.
  14. Document causes and trends of Refuge island erosion.

**Goal 3: Promote and support priority compatible fish and wildlife-dependent uses while maintaining the long-term health of the ecosystem and Service trust resources.**

*Discussion*

One of the major intentions of the Refuge System is to provide Refuge visitors with high-quality, safe, and enjoyable recreational experiences oriented toward wildlife, to the extent these activities are compatible with the purposes for which the Refuge was established. Wildlife conservation is the primary focus of the Refuge - opportunities for compatible recreational uses are important benefits that flow from this focus.

Limited accessibility affects all public uses found on the Refuge. Only certain portions of the Refuge are located on the mainland -- Buffalo Creek, Buckley Mainland and Captina Mainland. Middle Island (near St. Mary's, WV) and Wheeling Island (at Wheeling, WV) are connected to the mainland by bridges. The remaining refuge islands are only accessible by boat. Access to Buckley Island may be available through a sternwheeler company located in Marietta, OH. We will also add carry-down boat access points that could allow visitors to transport canoes or small boats into the river near adjacent refuge islands at two or three locations (e.g. Buffalo Creek, Buckley mainland, Muskingum Island backchannel).

All refuge properties will remain open daily to visitors, free of charge, from one hour before sunrise to one hour after sunset. Wildlife-dependent activities such as fishing, hunting, nature study, photography, environmental education, and wildlife observation will be encouraged.

All Refuge lands and waters will be available to sport fishing. The Service recognizes sport fishing as an acceptable, traditional form of wildlife-dependent recreation. Recreational fishing opportunity on Refuges is also consistent with, and an important implementation tool for, the Service's National Recreational Fisheries Policy. Refuge anglers will be required to comply with all applicable State fishing regulations while fishing Refuge waters, including licensing requirements.

Additional opportunities for fishing will be explored. We will review and update the existing fishing plan in consultation with state resource agencies, anglers and other members of the public. Such a plan would be accomplished with consideration and analysis of the demands and

impacts of additional access points, bank fishing at night on refuge lands, and opportunities for expanded fishing in acquired embayments and on islands. Also, we must define the conditions that are necessary to keep such fishing activities and programs compatible with refuge purposes and the System.

A special Refuge fishing brochure will provide anglers with more information about fishing opportunities. The Service does not set fishing regulations (e.g., allowable species, number and size limits, and seasons), and does not propose to do so. The Refuge does set Refuge public use conditions (e.g., Refuge open hours, no woodcutting, and no fires). Thus, the Refuge does not, and will not, set "fishing" regulations.

The Service recognizes hunting as an acceptable and legitimate form of wildlife dependent recreation as well as a management tool to effectively control certain wildlife population levels (e.g. deer). The decision to permit and manage hunting on a National Wildlife Refuge is made on a case-by-case basis by the Refuge Manager, and considers biological soundness, economic feasibility, effects on other Refuge programs, safety and public demand. Current demands and opportunities for the public to hunt in the vicinity of the Refuge are evaluated to determine the impacts a Refuge hunt would have on the overall opportunities in the area. Hunting on the Refuge must be coordinated with other public uses to minimize potential conflicts, and care is taken to ensure that adverse impacts to other wildlife, particularly threatened and endangered species, do not occur.

Refuges use Service administrative procedures and guidelines found in the FWS Refuge Manual to manage hunting programs. Section 8RM 5.5 states:

"Refuge hunting programs should be planned, supervised, conducted, and evaluated to promote positive hunting values and hunter ethics such as fair chase and sportsmanship. In general, hunting on Refuge lands should be superior to that available on other public or private lands and should provide participants with reasonable harvest opportunities, uncrowded conditions, few conflicts between hunters, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport. This may require zoning the hunt unit and limiting the number of participants. Good planning will minimize the controls and regimentation needed to achieve hunting objectives."

Although the overall demand for *expanded* hunting opportunities (above what is currently offered) was found to be low at the majority of public meetings and workshops held in preparation for this plan, the Refuge will offer and promote additional hunting opportunities through land acquisitions. Hunting is permitted on most Refuge properties (87% in 2001), with some special regulations in effect for safety and to ensure compatibility. Refuge hunting will include deer; waterfowl; other migratory game birds including coots, rails, gallinules, snipe, woodcock, and dove; rabbit and squirrel. Deer and waterfowl hunting will receive emphasis, as these uses are of equal or greater demand on Refuge lands than other types of hunting.

Deer hunting on the Refuge remains primarily restricted to archery due to safety considerations. The Refuge will coordinate with biological staffs of state resource agencies to discuss logistics of an expanded deer hunting program (i.e., such as primitive weapon use where appropriate, safety

issues, hunter density, permit system, sign needs, enforcement).

Migratory bird, rabbit, and squirrel hunting is restricted to shotgun. Non-toxic shot is required for all shotgun hunting on the Refuge. The possession of lead shot in the field by Refuge hunters is prohibited.

Dogs (e.g. retrievers and pointers) may be used during migratory bird hunting but must be kept under control and leashed when not in use. The use of pursuit dogs for any type of hunting is prohibited. All of the studies reviewed by refuge staff showed that dogs can and do chase deer and other wildlife; pursuit dogs can and do range far on a chase (0.2 - 13.4 miles), and most of the deer chased (>70%) left their home range for a day or more at a time (Progulske and Baskett, 1958) (Sweeney et al. 1971) (Corbett et al. 1971). Regardless of domestication, dogs are predators which maintain basic instincts to chase and hunt, and the predictability of their disturbance is diminished when they are off-leash (Sime 1999). The refuge has documented dogs off-leash killing wildlife on the refuge. Dogs off-leash increase the effective range of human disturbance to wildlife. The presence of sensitive habitats, areas of significant wildlife concentrations, and/or competing public uses would all be subject to disturbance by the use of pursuit dogs. In addition, the effect of free-running dogs on adjacent landowners and neighbors is considered in the compatibility determination. Given that refuge habitats are mostly small in size and close in proximity to wetland and aquatic habitats which support federal trust resources in fall and winter, and deer and waterfowl hunting and wildlife observation are concurrent public uses which would be adversely impacted by free-running dogs, the use of pursuit dogs on this Refuge is incompatible.

Considerable interest and demand has been shown for environmental education, and interpretative programs and activities. This plan calls for the Refuge to include a visitor contact station and environmental education wing with the construction of a new headquarters facility. An annual teachers workshop will be sponsored by the Refuge to familiarize educators with a curriculum and activities pertinent to the Refuge.

Strategies will focus on educating the public about responsible stewardship and threats to river resources. The Refuge will regularly sponsor special events such as guided walks and programs and offer additional sites that provide interpretive signing or brochures (trails, boat route, and auto tour).

With partners, the Refuge will also attempt to enhance public appreciation of Ohio River wildlife resources by installing interpretive signs at other off-Refuge locations.

The Refuge will take an active role in providing and maintaining sites and trails from which the public can view, study and photograph nature. Furthermore, the Refuge will expand public opportunities to enjoy and learn more about the wildlife resources of the Ohio River Valley (and the Refuge) through photography workshops, contests and an additional wildlife viewing blind.

The Service will evaluate all Refuge activities according to Refuge objectives. Wood fires, mowing and tree cutting will not be permitted because of damage to wildlife habitat. Permanent structures such as boat docks, stairways, shelters, rope swings, and water slides will not be

allowed. All night uses, including camping and boat mooring, will not be permitted.

There is a possibility that the number of boaters may increase, but not to a significant degree above existing levels. The Service assumes additional use of refuge islands would be redistributed from existing boaters towards Refuge activities. Increases in overall boating activity will likely be associated with non-wildlife dependent activities.

Although uses other than wildlife-dependent recreational activities occur on and near the Refuge, no facilities or programs are provided by the Refuge for their use. Bicycling and jogging on the Middle Island road, and picnicking and recreational boating are among those uses that occur; however, at their present locations and intensity they are not deemed incompatible with Refuge purposes or Service guidelines.

### General

1. Open Refuge for public use from one hour before sunrise until one hour after sunset daily (generally all of Refuge, exclusions as needed).
2. Distribute annually 9,000 Refuge primary brochures and fact sheets containing information about priority public uses and Refuge lands available for those uses.
3. Through an Internet web site, provide information about Refuge priority public uses by 2002.
4. As part of all land acquisitions, distribute news releases to local media highlighting priority public use opportunities available to visitors.
5. Maintain seven on-site Refuge informational kiosks at locations with high public use and install at least one additional kiosk per year, depending on land acquisitions.
6. In cooperation with partners, install eight strategically located Refuge informational kiosks at off-Refuge locations such as boat ramps.
7. Offer and promote at least six special events annually targeting Refuge priority recreation (e.g. International Migratory Bird Day, 4<sup>th</sup> of July Butterfly Count, nature photography workshop).
8. Coordinate with local ferry service to provide access to Buckley Island during summer months.
9. Provide carry down boat access at 2 to 3 locations.

### Hunting

1. Promote hunting on Refuge for deer, migratory game birds, rabbit, and squirrel, with special Refuge regulations in effect. 2. Distribute annually 1,500 Refuge hunt brochures providing information about deer hunting, waterfowl and other migratory birds, rabbit, and squirrel hunting opportunities on the Refuge.
2. Annually announce through news releases to local media information about hunting opportunities and season openings on Refuge property.
3. As part of all land acquisitions, provide through news releases information about hunting opportunities specific to each acquisition.
4. Offer an accessible deer hunting opportunity on Middle Island by 2003, and evaluate mainland properties for other accessible hunting opportunities (e.g. waterfowl).

5. Develop and promote youth deer and waterfowl hunts by 2003.
6. By 2003, install a barrier-free hunter access blind on Refuge property.
7. Provide hunting information through posted notices and news releases identifying Refuge hunting and non-hunting areas to reduce potential user conflicts.
8. Work with state departments of natural resources to promote hunting programs for women and youth.

### Fishing

1. Develop and distribute 5,000 Refuge fishing guides (with state agency input) by 2003.
2. Design and construct one accessible fishing pier on the Refuge by 2003.
3. Participate annually in National Fishing Week activities in cooperation with other state and federal agencies.
4. In consultation with state resource agencies, anglers and other members of the public, initiate review and update of the existing fishing plan in 2003. This will be accomplished upon completion of the Land Protection Plan (LPP), and with consideration and analysis of the demands and impacts of additional access points, bank fishing at night on refuge lands, opportunities for expanded fishing in acquired embayments and on islands.

### Environmental Education

1. Work with local educators to develop and provide a curriculum of Refuge-based activities targeting students in grades 3-12 by the year 2003.
2. Provide an annual teachers workshop by 2004.
3. Provide two outdoor education sites designed to compliment Refuge-based environmental education activities by 2004 (at Middle and Buckley Islands).
4. Coordinate with local commercial ferry service and educators to provide access to Buckley Island for teacher-led environmental education activities (outside of hunting seasons).

### Interpretation

1. By 2010, provide three on-site interpretive trails at locations targeted to meet the demands of population concentrations near the Refuge (such as Middle Island, Buckley Island, Wheeling Island, etc.)
2. Implement a self-guided wildlife boat tour at Muskingum Island by 2002, and another in the Willow Island Pool by 2005.
3. Maintain interpretive auto tour on Middle Island, and implement another in a road-accessible embayment by 2010.

### Wildlife Observation and Photography

1. Install a wildlife observation blind with barrier-free access on Middle Island by 2002 and an additional 1-2 blinds or platforms at other Refuge locations by 2010.
2. Provide annual wildlife photography workshops.
3. Offer an annual Friends Group-sponsored wildlife photography contest by 2003.

4. Provide a portable wildlife viewing blind for Refuge visitor loan through a Refuge Friends group by 2003.

**Goal 4: Raise public awareness of the values of the islands, embayments, and wetlands of the Ohio River.**

*Discussion*

Public awareness and appreciation of the Ohio River's floodplain habitats is a crucial link in building public support for the Refuge and its activities. Limited public access to refuge islands and other properties increase the need for off-refuge outreach to build this support. The Service has identified communities, conservation organizations, and the media among the key audiences for Refuge outreach efforts.

Community outreach through presentations to civic and other groups will occur more frequently, reflecting the need to reach additional communities. The refuge will increase its participation with conservation organizations and state agencies to offer special events and programs that highlight shared resource concerns. Contacts with the media will expand to include additional media markets. A Refuge Web site is in development and will include information about important habitats.

An active volunteer program is designed to directly involve residents of the local communities with Refuge programs and projects, and will expand. More student interns will also be recruited from local colleges.

1. Provide presentations to civic, professional, and other groups highlighting the values of and issues concerning the habitats and wildlife resources associated with the Ohio River's floodplain (approximately 20 - 25 per year).
2. Provide information about the values of the islands, embayments, and wetlands of the Ohio River on the Internet through a Refuge web site by 2002.
3. Solicit local media coverage of Refuge activities concerning habitat restoration and improvement projects (approximately two television interviews, two radio interviews, five newspaper articles and one magazine article per year).
4. Participate in off-Refuge special events (approximately five per year such as WV DNR Non-Game Wildlife Day, National Fishing Week) with exhibits highlighting Refuge wildlife resources.
5. Provide assistance for off-site environmental education when requested (approximately once a year).
6. Develop a wildlife interpretive sign (similar to one developed in partnership with the Marietta Natural History Society) for placement at a non-Refuge site along the Ohio River by 2005.
7. Promote Refuge volunteerism through active solicitation of 2-3 student interns per year and outreach to groups and individuals (approximately 300 volunteers/2,000 hours per year).
8. Develop a mobile Refuge education/outreach unit for use on and off the Refuge.

**Goal 5: Support the needs and staff of the Ohio River Islands NWR with sufficient staff, facilities, and equipment to fulfill the station's approved plan.**

*Discussion*

The Ohio River Islands NWR office is located at the side of a small shopping mall at 3004 7<sup>th</sup> Street in Parkersburg, West Virginia, with no visibility from the main highway. The Refuge office is a GSA rental unit. It is neatly kept, and decorated with wildlife-related materials. However, the current office location is not in a natural setting near the Refuge itself. Since its inception, the Refuge has lacked visibility, primarily due to its present location. Thus, it is necessary to construct a new 8,000 square foot Refuge headquarters, which we anticipate to be located on the Buckley Mainland property. (The Buckley mainland site is considered to be a viable option as it is one of the very few Refuge owned properties that is not located within the 100-year floodplain.) The headquarters would include office space for Refuge personnel, a maintenance shop, a storage facility for Refuge vehicles, boats and equipment, and a visitor contact station/educational wing. Additional equipment will be purchased to support an expanded habitat restoration program. The Refuge will secure temporary (or permanent housing) quarters for volunteers and temporary staff.

Additional staff will be hired to carry out expanded plans and goals for habitat restoration, environmental education, outdoor recreation and biological surveys. A total of 13 positions would be funded by the Service to carry out the Refuge mission. The annual Refuge budget will increase to support the Refuge staff, expanded Refuge programs, and involvement in the Ohio River Valley Ecosystem.

Boundary sign maintenance will continue to be a major task. Factors including high water, vandalism, and lush Japanese knotweed growth make periodic inspection, replacement and weed clearing a necessity.

Ohio River Islands NWR will continue to provide technical assistance and cooperation within the Ohio River Valley Ecosystem Team to the extent practicable. Volunteers will continue to be required for assistance in fulfilling the Refuge's mission and goals. Habitat restoration is anticipated to receive the most assistance.

The Service can enter into cooperative partnership agreements with private organizations to carry out restoration habitats for numerous purposes, including the recovery of Federally listed species, water quality improvements, and the enhancement of aquatic habitat and aquatic resources. The Partners for Fish and Wildlife funding will allow non-profit organizations to form additional restoration partnerships with other agencies and local landowners. The North American Wetlands Conservation Act also provides grant funding for land acquisition and restoration. The state resource agencies of Pennsylvania, Kentucky, West Virginia and Ohio will be considered partners, and utilized at every opportunity.

1. Establish a Refuge "Friends Group" by 2003.
2. Construct a visitor contact station/education wing with a new Refuge headquarters by the year 2006.

3. Maintain boats, automobiles, and farm equipment to the highest standards to effectively fulfill the mission of the Refuge.
4. Secure temporary quarters for volunteers and seasonal staff.
5. Foster partnerships with state agencies and local law enforcement personnel for monitoring and protecting Refuge properties.
6. Utilize the following staff to fulfill the mission of the Refuge:
  - Refuge Manager
  - Deputy Refuge Manager
  - Administrative Support Assistant
  - Office Clerk
  - Refuge Biologists (2)
  - Biological Technicians (1)
  - Outdoor Recreation Planners (2)
  - Maintenance Workers (2)
  - Park Rangers with law enforcement capabilities (2)

### **Alternatives Considered, but eliminated from detailed study**

Through the public scoping process, the interdisciplinary team arrived at four alternatives that were evaluated in the Draft CCP/EA. Other actions and alternatives were discarded during the analysis process.

*Custodial Management.* This alternative would minimize Refuge management, providing only those activities mandated by policy or regulation, such as exotic or invasive plant control, providing for public health and safety, or protecting threatened or endangered species. Public use opportunities would be drastically reduced, or eliminated on most Refuge lands, commensurate with reduced staffing and budgets. The Service's presence in the communities would be minimal. Under this alternative, resource issues would not be resolved, nor would Refuge goals and objectives be accomplished.

During our public scoping , a few individuals wanted a much reduced Service presence or no presence at all, primarily because it imposed on their non-wildlife dependent activities. While these comments were noted from only a few individuals, we did not otherwise hear recommendations for a custodial approach to management and, as such, we determined it did not need to be evaluated in detail.

### *Special Management Designation*

A wide variety of special land designations currently overlay national wildlife refuges. For most special management areas, responsibility (for authority for designation) is held by or shared by others. The Wilderness Act of 1964 directs the Secretary of the Interior to review, within ten years, every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a "minimum tool" management approach which requires refuge managers to use the least intrusive methods, equipment and facilities

necessary for administering the areas.

Among the other special management areas found on refuges are Research Natural Areas, Wild and Scenic Rivers, National Natural Landmarks, and National Trails.

Ohio River Islands Refuge does not have any properties suitable for Wilderness Designation. There are no tracts of at least 5,000 contiguous acres., and some of the islands do have roads (i.e., Middle, Wheeling). However, while most of the islands are roadless, they do not fit the other criteria. The islands have been logged, farmed, built upon, drilled for oil and gas, and are located in a series of pools artificially impounded for commercial navigation in one of the busiest inner-waterways in the United States. The islands do not always offer opportunities for solitude or primitive unconfined recreation due to the fact that commercial barge traffic, recreational boating and waterskiing occur adjacent to the islands. Many of the islands are located within or immediately adjacent to populated cities (i.e. Parkersburg, Marietta, St. Marys, Wheeling and Williamstown, to name a few).

**Figure 4 Summary of Management Actions and Strategies**

<b>Refuge Goals and Activities</b>	<b>Current Management</b>	<b>Preferred Alternative</b>
<b>Goal 1 - Habitat</b>	.	.
reforestation with native hardwoods	20 acres per year	50 acres per year
mowing, cutting, burning, and planting	none	none
exotic plant control	5 acres per year	30 acres per year
mussel quarantine and captive holding	X	X
wood duck nest boxes	60	60
prothonotary warbler boxes	50	80
bat and butterfly boxes	10	10
erosion protection	X	X
water level management	advocate natural cycles	manage refuge wetlands to mimic natural cycles
restore wetlands	1 acre per year	2 acres per year
longitudinal dikes/waddles for shoreline stabilization	none	1 mile per year

create snag habitat	none	X
trapping	trapping by permit	trapping by permit
acquire and/or protect additional habitat	8 islands (951 acres)	14 islands (2554acres)
<b>Goal 2 - Biological Monitoring</b>	migratory birds and mussels	migratory birds, mussels, Indiana bat, fish, insects, mammals, plants, and cover type mapping
surveys and inventories		
zebra mussel monitoring	6 sites annually	10 sites annually
waterfowl banding	none	100 ducks annually
historic species re-introductions	none	fish and mussels
<b>Goal 3 - Priority Public Uses</b>	refuge open from sunrise to sunset daily	refuge open 1 hr. before sunrise - 1 hr. after sunset
Refuge public use hours		
"carry-down" boat access locations	0	2-3
<u>Refuge recreation information</u>	.	.
general brochures	3000	9000
refuge Internet site	X	X
on-refuge info. kiosks	5	7
off-refuge info. kiosks	0	8
<u>Annual special events</u>	4	6+
<u>Interpretation</u>	1.5 miles - Middle Island (Including accessible portion)	1.5 - 3.0 miles at Middle Is. + trails at two other sites
trails		
boat tour routes	1	2
auto tour routes	1	2
<u>Wildlife Observation</u>	.	.
wildlife viewing blinds	1	2

<u>Wildlife Photography</u>	nothing	annual photography workshop and contest
<u>Hunting</u> special hunts	hunting allowed for archery deer, migratory game birds, rabbit and squirrel; special refuge regs. apply  none	hunting allowed for archery deer, migratory game birds, rabbit and squirrel; special refuge regs. apply  sponsor accessible hunt
<u>Environmental Education</u> teacher workshops develop refuge curriculum & activity guide outdoor education sites	. assist with teacher workshops  none  none	. sponsor teacher workshop  X  2
<u>Fishing</u> develop fishing guide accessible fishing pier	. none none	. X 1
<b>Goal 4 - Raise Public Awareness Outreach - public presentations</b>	10-15 annually	20-25 annually
Refuge Internet website	X	X
Off-refuge interpretive signs	1	2
Participate in off-refuge special events	3	5
Mobile outreach unit	none	X
Annual medial goals	1 t.v., 1 radio, 3 newspaper	2 t.v., 2 radio, 5 newspaper, 1 magazine
Refuge "Friends" group	none	X
Volunteers	200 individuals, 1-2 interns  1500 hours	300 individuals, 2-3 interns,  2000+ hours
"Naturalist Aboard Sternwheeler" Program	none	X

<b>Goal 5 - Staff and Facilities</b>	.	.
Staffing Level	6	13
Refuge Headquarters	existing GSA rental	new facility
Visitor Contact/E.E. wing	none	X
Quarters for Volunteers and Temporary Staff	none	X
		X

**Figure 5 Summary of Potential Impacts**

	<b>Current Management</b>	<b>Preferred Alternative</b>
<b>Primary Issues</b> <b>(Chapter 2, pages 15 to 17)</b>		
<i>1 - Does the alternative curb erosion of islands and banks?</i>	Yes, the alternative will have a neutral to slightly positive effect on erosion. Reforestation, wetland revegetation and working in conjunction with the Corps will help, but not to the extent of the Preferred Alternative.	Yes, the alternative will have a slightly positive effect on erosion. Reforestation, wetland revegetation, installation of longitudinal banks, land acquisition and working in conjunction with the Corps will help hold soils in place.
<i>Does the alternative decrease the sedimentation and siltation of shallow water embayment areas and the river?</i>	Not likely. Habitat activities would help retain soil in place, but this would likely have very little effect on the river.	Slightly. Protection of these critical areas would help to decrease sedimentation and siltation by preventing shoreline disturbance and development, and additional habitat measures in watersheds of the embayments themselves is <i>part</i> of the solution.
<i>2 - Does the alternative acquire or protect important fish and wildlife habitat in the area from impacts of development?</i>	Net benefit by proposing to protect eight more islands.  Overall net benefit by restoring 20 acres annually of native floodplain forest, restoring one acre per year of	Yes, by proposing to protect an additional 14 islands.  Yes, by restoring 50 acres annually of floodplain forest, restoring two acres per year of

<p><i>Does the alternative stem the continuing and future loss of habitat?</i></p>	<p>wetland habitat, and decreasing turbidity and sedimentation.</p>	<p>wetland habitat and installing one mile of longitudinal banks per year.</p>
<p><i>3 - Does the alternative control or eradicate the introduction and spread of invasive plants and aquatic species on Refuge lands and in the Ohio River?</i></p>	<p>Slightly. Control or eradicate about five acres of invasive plants per year and annually track the impact of zebra mussels on native freshwater mussels.</p>	<p>Yes. Control or eradicate about 30 acres of invasive plants per year, annually track the impact of zebra mussels on native freshwater mussels at 10 sites, and reintroduce fish and mussel species that have been extirpated from the Refuge.</p>
<p><i>4 - Does the alternative improve access to the river and islands for the general public?</i></p> <p><i>Does the alternative increase Refuge opportunities for people without boats?</i></p>	<p>No.</p> <p>Slightly, by construction of a .2-mile interpretive trail on Middle Island, the maintenance of an interpretive auto tour on Middle Island and offering four special events per year. Refuge hours are sunrise to sunset.</p>	<p>Yes. The Preferred Alternative proposes to coordinate with the local ferry service to provide access to Buckley Island during summer months.</p> <p>Yes, by maintaining the interpretive auto tour on Middle Island and potentially implementing another in a road-accessible embayment by 2010, and offering about six special events per year. Refuge is open one hour before sunrise to one hour after sunset.</p>
<p><i>5 - Does the alternative expand hunting opportunities?</i></p>	<p>No; hunting opportunities stay the same: archery deer, migratory birds, rabbit and squirrel. Special regulations limit dog use to retrieval purposes, limit species taken more so than state laws, prohibit baiting for deer or organized drives for deer. Land acquisition would increase hunting opportunities. Refuge hours are sunrise to sunset.</p>	<p>Yes, mostly because Refuge is open from one hour before sunrise to one hour after sunset. Many of the same conditions as current management, but opportunities would increase as more islands are acquired. Programs available for youth, women, and hunters with disabilities.</p>
<p><i>6 - Does the alternative improve and advance environmental education in the Ohio</i></p>	<p>No. Environmental education continues on an as-requested basis. Provide one interpretive trail, one self-guided boat tour, and one self-guided auto tour. Assist with on- and</p>	<p>Yes. Develop curriculum and activity guide with two outdoor education sites and an annual teachers workshop. Offer teacher-led environmental</p>

<p><i>River area for schoolchildren and the public?</i></p>	<p>off-refuge teacher workshops but do not initiate a curriculum of activities.</p>	<p>education activities on Buckley Island. Provide three interpretive trails, two self-guided boat tours, and two self-guided auto tours. Participate in off-refuge teacher workshops.</p>
<p><i>7 - Does the alternative make the general public more familiar with the Refuge's existence, regulations, mission, goals and the resources that need protection?</i></p>	<p>Yes, but not to the extent of the preferred alternative.</p>	<p>Yes.</p>
<p><i>8 - Does the alternative improve staffing and facilities to adequately meet the present and anticipated future needs of the Refuge?</i></p>	<p>No. Staffing would remain unchanged, and a headquarters/visitor contact station is not proposed.</p>	<p>Yes. Staffing would be increased to handle additional duties, and a headquarters and visitor contact station is proposed.</p>
<p><i>9 - Does the alternative address trapping as a use on Refuge lands?</i></p>	<p>Trapping would be allowed for management purposes per Refuge permits and regulations.</p>	<p>Yes. Trapping would be allowed for management purposes per Refuge permits and regulations.</p>

## **Implementation and Monitoring**

### **Background**

Refuge lands are managed as defined under the National Wildlife Refuge System Improvement Act of 1997, Fish and Wildlife Manual, sound biological principles, and up-to-date research. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges which, unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources. Recreational values are accommodated where appropriate and compatible, while still meeting the Congressional mandates of wildlife conservation first. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but consideration is given to balancing the needs and demands for wildlife-dependent recreation and environmental education.

### **Step-Down Management Plans**

This planning effort reflects the basic needs identified by Service staff, the public, partners and planning team members for the management of fish and wildlife populations, habitats, visitor services, general administration, land protection, and conservation. Among these projects is a list of step-down plans to be developed. Step-down plans describe the specific management actions we intend to follow, "stepping down" from general goals, objectives, and strategies. Some specific plans may need revisions, while others will need to be developed. The preparation of new step-down plans (or substantial changes to existing step-down plans) typically require further compliance with NEPA and other policies, as well as an opportunity for public review.

The Refuge System Manual, Part 4, Chapter 3, lists over 25 specific management plans that are potentially required on Refuges. Some plans require annual revisions or programs, and others are on a 5 to 10 year revision schedule.

Following is a list of required plans and a schedule for their completion:

#### ***1) Occupational Safety and Health Plan ..... Revise by June 2002***

- (a) Safety Programs*
- (b) Safety Operations*
- (c) Flood Contingency*
- (d) Emergency Spill Response*

**2) Cultural Resources Management Plan ..... Initiate and Complete by December 2004**

**3) Habitat Management Plan ..... Initiate and Complete by December 2002**

- (a) Reforestation
- (b) Wetland Restoration
- (c) Shoreline Stabilization and Revegetation
- (d) Exotic Plant Species Control

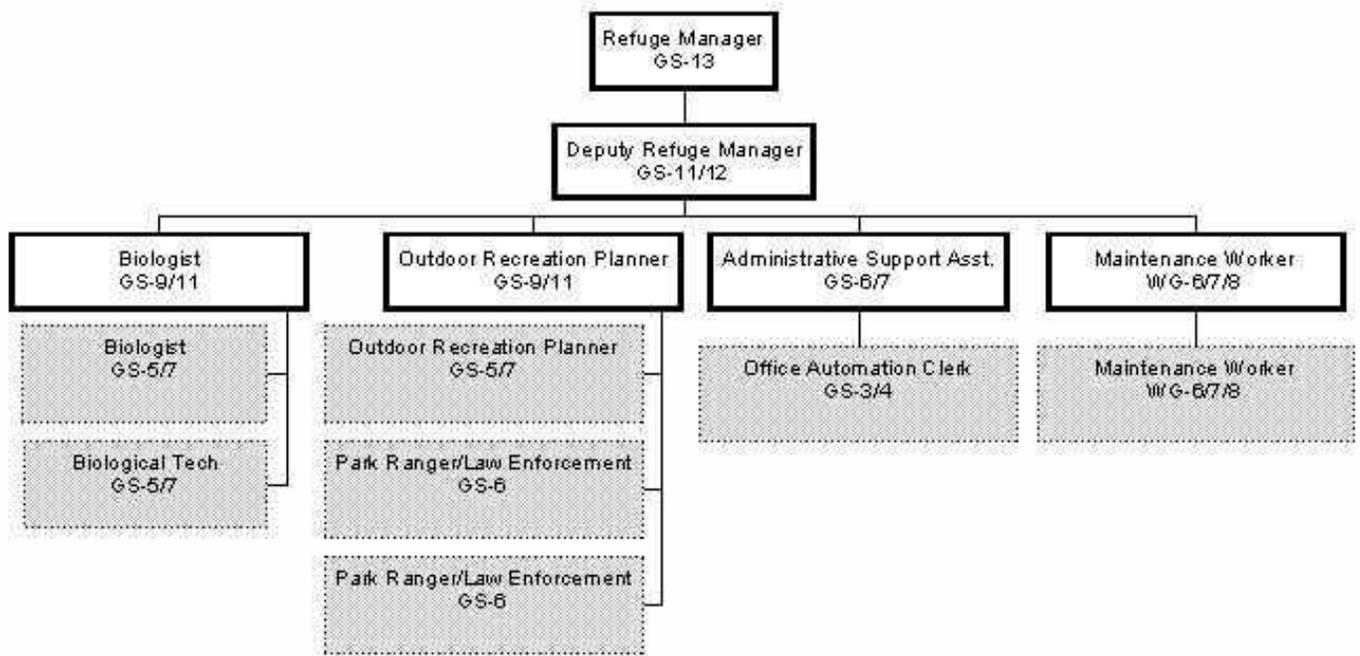
**4) Wildlife-dependent Recreation Plan ..... Revise by June 2004**

- (a) Hunting . Completed
- (b) Fishing . Completed
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- (d) Wildlife Photography
- (e) Environmental Education
- (f) Interpretation

**5) Law Enforcement Plan ..... Initiate and Complete by June 2003**

**6) Population Management Plan ..... Complete by June 2004**

- (a) Wildlife Inventory . In Progress
- (b) Furbearer Management
- (c) Nest Boxes
- (d) Endangered Species Recovery
- (e) Marking and Banding
- (f) Propagation and Stocking



*Minimum Standard: 13 FTE's -- Existing Permanent Staff: 6 FTE's(unshaded) Unfilled Positions: 7 FTE's (shaded)*

### **Compatibility Determinations**

The Refuge Manager will usually complete compatibility determinations as part of the

comprehensive conservation plan or step-down management plan process for individual uses, specific use programs, or groups of related uses described in the plan. When we add lands to the Refuge System, the Refuge Manager assigned management responsibility for the land to be acquired will identify prior to acquisition the existing wildlife- dependent recreational public uses (if any) determined to be compatible that we will permit to continue. However, since we will not be addressing land acquisition in this document, and instead will be preparing a subsequent Land Protection Plan (LPP), Service policy states that the compatibility determinations should be made in conjunction with the preparation and release of the appropriate pre-acquisition realty documentation, prepared pursuant to NEPA.

***Compatibility determinations in existence prior to the effective date of the compatibility policy will remain in effect until and unless modified and will be subject to periodic reevaluation.*** We will not initiate or permit a new use of a national wildlife refuge or expand, renew, or extend an existing use of a national wildlife refuge, unless we have determined that the use is a compatible use and that the use is not inconsistent with public safety.

We do not require a compatibility determination for refuge management activities as defined by the term "refuge management activity" except for "refuge management economic activities." Examples of refuge management activities that do not require a compatibility determination include: prescribed burning; water level management; invasive species control; routine scientific monitoring, studies, surveys, and censuses; historic preservation activities; law enforcement activities; and maintenance of existing refuge facilities, structures, and improvements.

## **Plan Performance**

The National Wildlife Refuge System Improvement Act requires that the Service monitor fish, wildlife, and plants on refuges in order to establish status and trends of both resident and migratory wildlife. Monitoring is an essential component of this plan, and specific strategies have been integrated into the previously described goals and objectives. All habitat management activities will be monitored to assess whether the desired effect on wildlife and habitat components has been achieved. Baseline surveys will be established for other species of wildlife for which existing or historical numbers are not well known. It also may be important to begin studies to monitor the response of wildlife to increased visitor use. Management of projects is dependent on monitoring and evaluation to sustain the function and dynamics of the forested floodplain, maintaining biological diversity, protecting target species, and providing a variety of wildlife-dependent recreation and education experiences of value to visitors. Information derived from monitoring and evaluation will enable managers to adjust and test the management objectives outlined in this plan.

This plan would be reviewed annually to determine the need for revision and adjust and set priorities. Revisions to the plan would be subject to National Environmental Policy Act review, as well as public review. Management performance is documented in annual narratives. A new plan is required after 15 years.

## **Partnership Opportunities**

Public outreach entails a variety of services and support that refuges provide to the public, special groups, other government agencies and individuals. It includes technical assistance to state agencies on special problems and publications and presentations to local civic groups and schools. Many biologists and private citizens, as well as environmental organizations, scientific organizations and other agencies, have expressed a great interest in the management of this and other refuges. Maintaining and developing partnerships will enable the refuge to achieve its goals and objectives, minimize costs, share funding and bridge relationships with others. To maintain and enhance wildlife outside of the refuge, the Service will focus its efforts on continuing to develop partnerships with landowners, the state resource agencies, and interested conservation and sportsmen groups. Although the Service does not have management responsibilities for those lands outside the refuge, it is important to articulate the wildlife resource needs area wide. Collaboration with colleges and universities and with conservation organizations will enable the refuge to carry on its plans for research, monitoring, and education. To create awareness and expand environmental education efforts in the community, partnerships will be established or expanded with organizations and school systems.

### **Monitoring and Evaluation**

Wildlife population monitoring and habitat monitoring (as addressed in Goal 2) will be emphasized. Wildlife monitoring will include surveys during the appropriate seasons, species richness measurements, and relative abundance figures. Habitat monitoring will primarily involve the amount and distribution of habitats, vegetation surveys, community composition and structure, and representative components and habitat parameters.

Planning is a dynamic process, and this CCP (and the more specific related step-down plans) are subject to reviews and modification when appropriate. Work plans are submitted annually for funding. Further, monitoring and evaluation criteria could be established by the Ohio River Valley Ecosystem team. It would be the responsibility of the Refuge staff to complete monitoring under the time frames and conditions called for in respective plans. Effectiveness monitoring would provide the basis for an adaptive management response.

Adaptive management is a flexible approach to long-term management of biotic resources which is directed over time by the results of ongoing monitoring activities and other information. Adaptive management is a process in which projects are implemented

within a framework of scientifically driven experiments to test predictions and assumptions as outlined in this plan. The biological programs are systematically evaluated to determine management effects on wildlife populations. This information is used to refine approaches and to determine how effectively goals and objectives are being accomplished. Evaluations will be conducted on a regular basis to provide feedback to stakeholders and partners. If monitoring and evaluation yield undesirable effects for target and non-target species and/or communities, management projects will be altered and the CCP may be revised.

Monitoring and evaluation will occur at two levels. The first level, referred to herein as "implementation monitoring", responds to the question:

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## Appendix B

# Implementation and Monitoring

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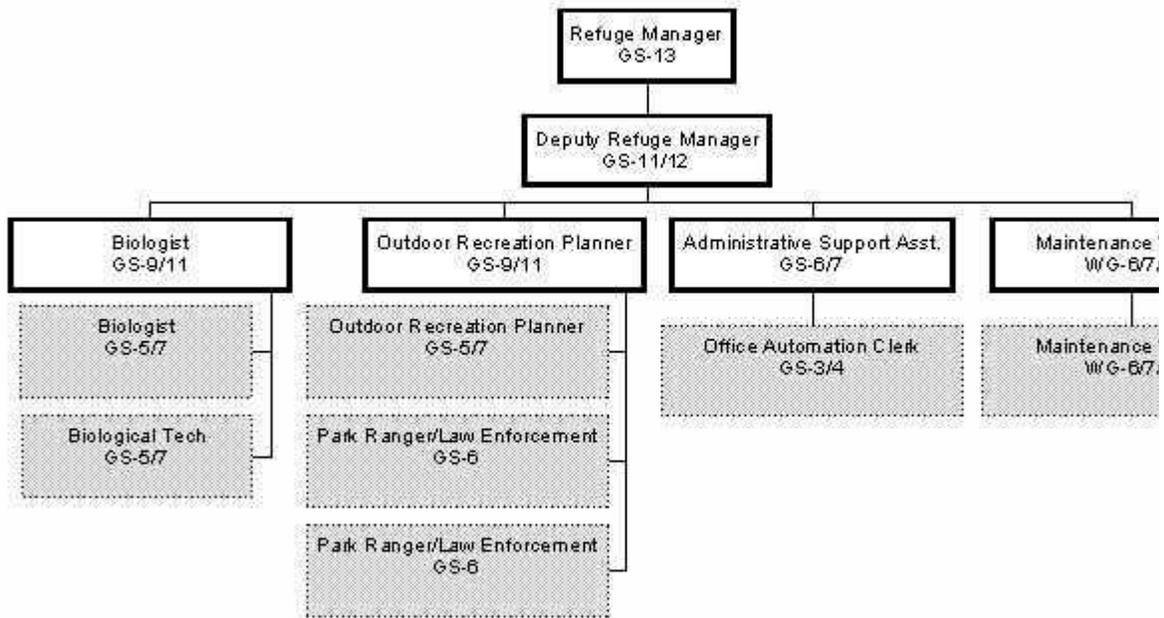
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## Appendix C

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## Appendix D

### Refuge Mollusks – Mussels, clams, snails, and slugs

<b>FAMILY</b>	<b>Scientific Name</b>	<b>COMMON NAME</b>	<b>STATUS</b>	<b>ORIGIN *</b>
Cionellidae	<i>Cionella lubrica</i>	Glossy pillar		N
Corbiculidae	<i>Corbicula fluminea</i>	Asiatic clam		E
Dreissenidae	<i>Dreissena polymorpha</i>	Zebra mussel		E
Helicodiscodae	<i>Helicodiscus parallelus</i>	Compound coil		N
Hydrobiidae	<i>Birgella subglobosus</i>	Globe siltsnail		N
Limacidae	<i>Deroceras leave</i>	Meadow slug		N
Limacidae	<i>Lehmannia poirieri</i>	Banded slug		E
Pleuroceridae	<i>Lithasia armigera</i>	Armored rocksnail		N
Pleuroceridae	<i>Lithasia verrucosa</i>	Varicose rocksnail		N
Pleuroceridae	<i>Pleurocera canaliculata</i>	Silty hornsnail		N
Polygyridae	<i>Mesodon mitchellianus</i>	Sealed globelet		N
Polygyridae	<i>Mesodon thyroidus</i>	Whitelip globe		N
Polygyridae	<i>Neohelix albolabris</i>	Whitelip		N
Polygyridae	<i>Webbhelix multilineata</i>	Striped whitelip		N
Pupillidae	<i>Gastrocopta armifera</i>	Armed snaggletooth		N
Pupillidae	<i>Gastrocopta contracta</i>	Bottleneck snaggletooth		N
Succineidae	<i>Novisuccinea ovalis</i>	Oval ambersnail		N
Unionidae	<i>Actinonaias ligamentina</i>	Mucket		N
Unionidae	<i>Amblema plicata</i>	Threeridge		N
Unionidae	<i>Cyclonaias nodulata</i>	Wartyback		N
Unionidae	<i>Cyclonaias pustulosa</i>	Pimpleback		N
Unionidae	<i>Cyclonaias tuberculata</i>	Purple Wartyback		N
Unionidae	<i>Cyprogenia stegaria</i>	Fanshell	Federally endangered	N
Unionidae	<i>Ellipsaria lineolata</i>	Butterfly		N
Unionidae	<i>Elliptio crassidens</i>	Elephantear		N
Unionidae	<i>Epioblasma obliquata</i>	Catspaw	Federally endangered; reintroduced in WV	N
Unionidae	<i>Epioblasma rangiana</i>	Northern Riffleshell	Federally endangered; reintroduced in WV	N
Unionidae	<i>Epioblasma triquetra</i>	Snuffbox	Federally endangered	N
Unionidae	<i>Eurynia dilatata</i>	Spike	Reintroduced in PA, WV	N
Unionidae	<i>Fusconaia flava</i>	Wabash Pigtoe		N
Unionidae	<i>Fusconaia subrotunda</i>	Longsolid		N
Unionidae	<i>Lampsilis abrupta</i>	Pink Mucket	Federally Endangered	N
Unionidae	<i>Lampsilis cardium</i>	Plain Pocketbook		N
Unionidae	<i>Lampsilis fasciola</i>	Wavyrayed Lampmussel		N
Unionidae	<i>Lampsilis ovata</i>	Pocketbook		N
Unionidae	<i>Lampsilis siliquoidea</i>	Fatmucket		N
Unionidae	<i>Lampsilis teres</i>	Yellow Sandshell		N
Unionidae	<i>Lasmigona complanata</i>	White Heelsplitter		N
Unionidae	<i>Lasmigona costata</i>	Flutedshell		N

Unionidae	<i>Leptodea fragilis</i>	Fragile Papershell		N
Unionidae	<i>Ligumia recta</i>	Black Sandshell		N
Unionidae	<i>Megaloniaias nervosa</i>	Washboard		N
Unionidae	<i>Obliquaria reflexa</i>	Threehorn Wartyback		N
Unionidae	<i>Obovaria subrotunda</i>	Round Hickorynut		N
Unionidae	<i>Plethobasus cyphus</i>	Sheepnose	Federally endangered	N
Unionidae	<i>Pleurobema clava</i>	Clubshell	Federally endangered; reintroduced in WV	N
Unionidae	<i>Pleurobema cordatum</i>	Ohio Pigtoe		N
Unionidae	<i>Pleurobema sintoxia</i>	Round Pigtoe		N
Unionidae	<i>Potamilus alatus</i>	Pink Heelsplitter		N
Unionidae	<i>Potamilus ohioensis</i>	Pink Papershell		N
Unionidae	<i>Pyganodon grandis</i>	Giant Floater		N
Unionidae	<i>Quadrula quadrula</i>	Mapleleaf		N
Unionidae	<i>Reginaia ebena</i>	Ebonysshell		N
Unionidae	<i>Simpsonaias ambugua</i>	Salamander Mussel		N
Unionidae	<i>Strophitus undulatus</i>	Creeper		N
Unionidae	<i>Theliderma metanevra</i>	Monkeyface		N
Unionidae	<i>Toxolasma parvum</i>	Lilliput		N
Unionidae	<i>Tritogonia verrucosa</i>	Pistolgrip		N
Unionidae	<i>Truncilla donaciformis</i>	Fawnsfoot		N
Unionidae	<i>Truncilla truncata</i>	Deertoe		N
Unionidae	<i>Uniomerus tetralasmus</i>	Pondhorn		N
Unionidae	<i>Utterbackia imbecillis</i>	Paper Pondshell		N
Unionidae	<i>Utterbackiana suborbiculata</i>	Flat Floater		N
Unionidae	<i>Villosa fabalis</i>	Rayed Bean	Federally endangered	N
Viviparidae	<i>Campeloma decisum</i>	Pointed campeloma		N
Zonitidae	<i>Hawaiiia minuscule</i>	Minute gem		E
Zonitidae	<i>Ventridens ligera</i>	Globose dome		N

\* N = Native; E = Exotic

Refuge Birds (2016 AOU Nomenclature) (257 species)

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Ducks, Geese, Swans	Anatidae	<i>Anser albifrons</i>	Greater White-fronted Goose	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Branta canadensis</i>	Canada Goose	PR	N
Ducks, Geese, Swans	Anatidae	<i>Branta hutchinsii</i>	Cackling Goose	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Chen caerulescens</i>	Lesser Snow Goose	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Chen rossii</i>	Ross's Goose	A	N
Ducks, Geese, Swans	Anatidae	<i>Cygnus buccinator</i>	Trumpeter Swan	A	N
Ducks, Geese, Swans	Anatidae	<i>Cygnus columbianus</i>	Tundra Swan	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Cygnus olor</i>	Mute Swan	M,W	E
Ducks, Geese, Swans	Anatidae	<i>Clangula hyemalis</i>	Long-tailed Duck	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Aix sponsa</i>	Wood Duck	B,M	N
Ducks, Geese, Swans	Anatidae	<i>Anas acuta</i>	Northern Pintail	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Anas americana</i>	American Wigeon	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Anas clypeata</i>	Northern Shoveler	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Anas crecca</i>	Green-winged Teal	M	N
Ducks, Geese, Swans	Anatidae	<i>Anas discors</i>	Blue-winged Teal	M	N
Ducks, Geese, Swans	Anatidae	<i>Anas platyrhynchos</i>	Mallard	B,W,M	N
Ducks, Geese, Swans	Anatidae	<i>Anas rubripes</i>	American Black Duck	B,W,M	N
Ducks, Geese, Swans	Anatidae	<i>Anas strepera</i>	Gadwall	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Aythya affinis</i>	Lesser Scaup	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Aythya americana</i>	Redhead	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Aythya collaris</i>	Ring-necked Duck	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Aythya marila</i>	Greater Scaup	M,W	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Ducks, Geese, Swans	Anatidae	<i>Aythya valisneria</i>	Canvasback	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Bucephala albeola</i>	Bufflehead	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Bucephala clangula</i>	Common Goldeneye	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Lophodytes cucullatus</i>	Hooded Merganser	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Melanitta fusca</i>	White-winged Scoter	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Melanitta perspicillata</i>	Surf Scoter	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Melanitta americana</i>	Black Scoter	A	N
Ducks, Geese, Swans	Anatidae	<i>Histrionicus histrionicus</i>	Harlequin Duck	A	N
Ducks, Geese, Swans	Anatidae	<i>Mergus merganser</i>	Common Merganser	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Mergus serrator</i>	Red-breasted Merganser	M,W	N
Ducks, Geese, Swans	Anatidae	<i>Oxyura jamaicensis</i>	Ruddy Duck	M,W	N
New World Quail	Odontophoridae	<i>Colinus virginianus</i>	Northern Bobwhite	A	N
Partridges, Grouse, Turkey	Phasianidae	<i>Phasianus colchicus</i>	Ring-necked Pheasant	A	E
Partridges, Grouse, Turkey	Phasianidae	<i>Bonasa umbellus</i>	Ruffed Grouse	PR	N
Partridges, Grouse, Turkey	Phasianidae	<i>Meleagris gallopavo</i>	Wild Turkey	PR	N
Grebes	Podicipedidae	<i>Podiceps auritus</i>	Horned Grebe	M,W	N
Grebes	Podicipedidae	<i>Podiceps grisegena</i>	Red-necked Grebe	M,W	N
Grebes	Podicipedidae	<i>Podilymbus podiceps</i>	Pie-billed Grebe	M,W	N
Pigeons and Doves	Columbidae	<i>Columba livia</i>	Rock Dove	PR	E
Pigeons and Doves	Columbidae	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	A	E
Pigeons and Doves	Columbidae	<i>Zenaida macroura</i>	Mourning Dove	PR	N
Cuckoos	Cuculidae	<i>Coccyzus americana</i>	Yellow-billed Cuckoo	B,M	N
Cuckoos	Cuculidae	<i>Coccyzus</i>	Black-billed	B,M	N

GROUP	FAMILY	SCIENTIFIC NAME	COMMON NAME	RESIDENCE *	ORIGIN **
		<i>erythrophthalmus</i>	Cuckoo		
Goatsuckers	Caprimulgidae	<i>Chordeiles minor</i>	Common Nighthawk	M,SR	N
Swifts	Apodidae	<i>Chaetura pelagica</i>	Chimney Swift	M,SR	N
Hummingbird	Trochilidae	<i>Archilochus colubris</i>	Ruby-throated Hummingbird	B,M	N
Rails, Gallinules, Coots	Rallidae	<i>Fulica americana</i>	American Coot	M,W	N
Rails, Gallinules, Coots	Rallidae	<i>Porphyryla martinica</i>	Purple Gallinule	A	N
Rails, Gallinules, Coots	Rallidae	<i>Porzana carolina</i>	Sora	M	N
Rails, Gallinules, Coots	Rallidae	<i>Rallus limicola</i>	Virginia Rail	M	N
Rails, Gallinules, Coots	Rallidae	<i>Rallus elegans</i>	King Rail	A	N
Cranes	Gruidae	<i>Antigone canadensis</i>	Sandhill crane	A	N
Stilts and Avocets	Recurvirostridae	<i>Himantopus mexicanus</i>	Black-necked Stilt	A	N
Stilts and Avocets	Recurvirostridae	<i>Recurvirostra americana</i>	American Avocet	A	N
Plovers	Charadriidae	<i>Charadrius semipalmatus</i>	Semipalmated Plover	M	N
Plovers	Charadriidae	<i>Charadrius melodus</i>	Piping plover	A	N
Plovers	Charadriidae	<i>Charadrius vociferus</i>	Killdeer	PR	N
Plovers	Charadriidae	<i>Pluvialis squatarola</i>	Black-bellied Plover	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Numenius phaeopus</i>	Whimbrel	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Actitis macularia</i>	Spotted Sandpiper	B,M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Limosa haemastica</i>	Hudsonian Godwit	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Limosa fedoa</i>	Marbled Godwit	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Arenaria interpres</i>	Ruddy Turnstone	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris canutus</i>	Red Knot	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris himantopus</i>	Stilt Sandpiper	A	N
Sandpipers,	Scolopacidae	<i>Calidris alpina</i>	Dunlin	M	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Phalaropes					
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris bairdii</i>	Baird's sandpiper	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris fuscicollis</i>	White-rumped Sandpiper	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris melanotos</i>	Pectoral Sandpiper	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris minutilla</i>	Least Sandpiper	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris subruficollis</i>	Buff-breasted Sandpiper	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris pusilla</i>	Semipalmated Sandpiper	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Calidris mauri</i>	Western Sandpiper	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Limnodromus griseus</i>	Short-billed Dowitcher	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Tringa flavipes</i>	Lesser Yellowlegs	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Tringa melanoleuca</i>	Greater Yellowlegs	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Tringa solitaria</i>	Solitary Sandpiper	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Gallinago gallinago</i>	Common Snipe	M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Scolopax minor</i>	American Woodcock	B,M	N
Sandpipers, Phalaropes	Scolopacidae	<i>Phalaropus tricolor</i>	Wilson's Phalarope	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Phalaropus lobatus</i>	Red-necked Phalarope	A	N
Sandpipers, Phalaropes	Scolopacidae	<i>Phalaropus fulicarius</i>	Red Phalarope	A	N
Gulls, Terns	Laridae	<i>Larus argentatus</i>	Herring Gull	B,M,W	N
Gulls, Terns	Laridae	<i>Larus delawarensis</i>	Ring-billed Gull	M,W	N
Gulls, Terns	Laridae	<i>Larus hyperboreus</i>	Glaucous Gull	A	N
Gulls, Terns	Laridae	<i>Larus marinus</i>	Great Black-backed Gull	A	N
Gulls, Terns	Laridae	<i>Larus dominicanus</i>	Kelp Gull	A	N
Gulls, Terns	Laridae	<i>Larus philadelphia</i>	Bonaparte's Gull	M	N
Gulls, Terns	Laridae	<i>Xema sabini</i>	Sabine's Gull	A	N
Gulls, Terns	Laridae	<i>Larus fuscus</i>	Lesser Black-backed Gull	A	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Gulls, Terns	Laridae	<i>Larus glaucoides</i>	Iceland Gull	A	N
Gulls, Terns	Laridae	<i>Chlidonias niger</i>	Black Tern	M	N
Gulls, Terns	Laridae	<i>Sterna caspia</i>	Caspian Tern	M	N
Gulls, Terns	Laridae	<i>Sterna forsteri</i>	Forster's Tern	M	N
Gulls, Terns	Laridae	<i>Sterna hirundo</i>	Common Tern	M	N
Loons	Gaviidae	<i>Gavia immer</i>	Common Loon	M,W	N
Loons	Gaviidae	<i>Gavia stellata</i>	Red-throated Loon	M,W	N
Frigatebirds	Fregatidae	<i>Fregata magnificens</i>	Magnificent Frigatebird	A	N
Cormorants	Phalacrocoracidae	<i>Phalacrocorax auritus</i>	Double-crested Cormorant	M,W	N
Pelicans	Pelecanidae	<i>Pelecanus erythrorhynchus</i>	American White Pelican	A	N
Bitterns, Herons	Ardeidae	<i>Botaurus lentiginosus</i>	American Bittern	M,SR	N
Bitterns, Herons	Ardeidae	<i>Casmerodius albus</i>	Great Egret	M	N
Bitterns, Herons	Ardeidae	<i>Egretta thula</i>	Snowy Egret	M	N
Bitterns, Herons	Ardeidae	<i>Ixobrychus exilis</i>	Least Bittern	M	N
Bitterns, Herons	Ardeidae	<i>Ardea herodias</i>	Great Blue Heron	PR	N
Bitterns, Herons	Ardeidae	<i>Butorides striatus</i>	Green Heron	B,M	N
Bitterns, Herons	Ardeidae	<i>Egretta tricolor</i>	Tricolored Heron	A	N
Bitterns, Herons	Ardeidae	<i>Nyctanassa violacea</i>	Yellow-crowned Night Heron	A	N
Bitterns, Herons	Ardeidae	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	M,SR	N
Ibises and Spoonbills	Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis	A	N
Ibises and Spoonbills	Threskiornithidae	<i>Plegadis chihi</i>	White-faced Ibis	A	N
New World Vultures	Cathartidae	<i>Cathartes aura</i>	Turkey Vulture	B,M	N
New World Vultures	Cathartidae	<i>Coragyps atratus</i>	Black Vulture	B,M	N
Ospreys	Pandionidae	<i>Pandion haliaeetus</i>	Osprey	B,M	N
Hawks, Eagles	Accipitridae	<i>Accipiter cooperii</i>	Cooper's Hawk	PR	N
Hawks,	Accipitridae	<i>Accipiter striatus</i>	Sharp-shinned	PR	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Eagles			Hawk		
Hawks, Eagles	Accipitridae	<i>Buteo jamaicensis</i>	Red-tailed Hawk	PR	N
Hawks, Eagles	Accipitridae	<i>Buteo lagopus</i>	Rough-legged Hawk	M,W	N
Hawks, Eagles	Accipitridae	<i>Buteo lineatus</i>	Red-shouldered Hawk	PR	N
Hawks, Eagles	Accipitridae	<i>Buteo platypterus</i>	Broad-winged Hawk	M	N
Hawks, Eagles	Accipitridae	<i>Circus cyaneus</i>	Northern Harrier	M,W	N
Hawks, Eagles	Accipitridae	<i>Haliaeetus leucocephalus</i>	Bald Eagle	M,W,B	N
Hawks, Eagles	Accipitridae	<i>Aquila chrysaetos</i>	Golden Eagle	M,W	N
Barn Owls	Tytonidae	<i>Tyto alba</i>	Barn Owl	PR	N
Typical Owls	Strigidae	<i>Bubo virginianus</i>	Great Horned Owl	PR	N
Typical Owls	Strigidae	<i>Megascops asio</i>	Eastern Screech Owl	PR	N
Typical Owls	Strigidae	<i>Strix varia</i>	Barred Owl	PR	N
Typical Owls	Strigidae	<i>Asio otus</i>	Long-eared Owl	A	N
Kingfishers	Alcedinidae	<i>Megaceryle alcyon</i>	Belted Kingfisher	PR	N
Woodpeckers	Picidae	<i>Dryocopus pileatus</i>	Pileated Woodpecker	PR	N
Woodpeckers	Picidae	<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	PR	N
Woodpeckers	Picidae	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	PR	N
Woodpeckers	Picidae	<i>Picoides pubescens</i>	Downy Woodpecker	PR	N
Woodpeckers	Picidae	<i>Picoides villosus</i>	Hairy Woodpecker	PR	N
Woodpeckers	Picidae	<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	M,W	N
Woodpeckers	Picidae	<i>Colaptes auratus</i>	Northern Flicker	PR	N
Falcons	Falconidae	<i>Falco columbarius</i>	Merlin	M,W	N
Falcons	Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	PR	N
Falcons	Falconidae	<i>Falco sparverius</i>	American Kestrel	PR	N
Tyrant Flycatchers	Tyrannidae	<i>Contopus virens</i>	Eastern Wood-pewee	B,M	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Tyrant Flycatchers	Tyrannidae	<i>Empidonax minimus</i>	Least Flycatcher	M	N
Tyrant Flycatchers	Tyrannidae	<i>Empidonax alnorum</i>	Alder Flycatcher	M	N
Tyrant Flycatchers	Tyrannidae	<i>Empidonax traillii</i>	Willow Flycatcher	B,M	N
Tyrant Flycatchers	Tyrannidae	<i>Empidonax virescens</i>	Acadian Flycatcher	B,M	N
Tyrant Flycatchers	Tyrannidae	<i>Myiarchus crinitus</i>	Great Crested Flycatcher	B,M	N
Tyrant Flycatchers	Tyrannidae	<i>Sayornis phoebe</i>	Eastern Phoebe	B,M	N
Tyrant Flycatchers	Tyrannidae	<i>Tyrannus tyrannus</i>	Eastern Kingbird	B,M	N
Vireos	Vireonidae	<i>Vireo flavifrons</i>	Yellow-throated Vireo	B,M	N
Vireos	Vireonidae	<i>Vireo gilvus</i>	Warbling Vireo	B,M	N
Vireos	Vireonidae	<i>Vireo griseus</i>	White-eyed Vireo	B,M	N
Vireos	Vireonidae	<i>Vireo olivaceus</i>	Red-eyed Vireo	B,M	N
Vireos	Vireonidae	<i>Vireo philadelphicus</i>	Philadelphia Vireo	M	N
Vireos	Vireonidae	<i>Vireo solitarius</i>	Blue-headed Vireo	M	N
Jays and Crows	Corvidae	<i>Corvus brachyrhynchos</i>	American Crow	PR	N
Jays and Crows	Corvidae	<i>Cyanocitta cristata</i>	Blue Jay	PR	N
Jays and Crows	Corvidae	<i>Corvus corax</i>	Common Raven	A	N
Swallows	Hirundinidae	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	B,M	N
Swallows	Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	B,M	N
Swallows	Hirundinidae	<i>Riparia riparia</i>	Bank Swallow	B,M	N
Swallows	Hirundinidae	<i>Progne subis</i>	Purple Martin	B,M	N
Swallows	Hirundinidae	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	B,M	N
Swallows	Hirundinidae	<i>Tachycineta bicolor</i>	Tree Swallow	B,M	N
Chickadees and Titmice	Paridae	<i>Parus atricapillus</i>	Black-capped Chickadee	M,W	N
Chickadees and Titmice	Paridae	<i>Parus carolinensis</i>	Carolina Chickadee	PR	N
Chickadees and Titmice	Paridae	<i>Parus bicolor</i>	Eastern Tufted Titmouse	PR	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Nuthatches	Sittidae	<i>Sitta canadensis</i>	Red Breasted Nuthatch	M,W	N
Nuthatches	Sittidae	<i>Sitta carolinensis</i>	White Breasted Nuthatch	PR	N
Creepers	Certhiidae	<i>Certhia americana</i>	Brown Creeper	M,W	N
Wrens	Trogloditidae	<i>Cistothorus platensis</i>	Sedge Wren	M, SR	N
Wrens	Trogloditidae	<i>Thryothorus ludovicianus</i>	Carolina Wren	PR	N
Wrens	Trogloditidae	<i>Troglodytes aedon</i>	House Wren	B,M	N
Wrens	Trogloditidae	<i>Troglodytes troglodytes</i>	Winter Wren	M,W	N
Wrens	Trogloditidae	<i>Cistothorus palustris</i>	Marsh wren	A	N
Gnatcatchers	Poliopitilidae	<i>Poliopitila caerulea</i>	Blue-grey Gnatcatcher	B,M	N
Kinglets	Regulidae	<i>Regulus calendula</i>	Ruby-crowned Kinglet	M	N
Kinglets	Regulidae	<i>Regulus satrapa</i>	Golden-crowned Kinglet	M,W	N
Thrushes	Turdidae	<i>Catharus minimus</i>	Gray-cheeked Thrush	M	N
Thrushes	Turdidae	<i>Catharus ustulatus</i>	Swainson's Thrush	M	N
Thrushes	Turdidae	<i>Hylocichla mustelina</i>	Wood Thrush	B,M	N
Thrushes	Turdidae	<i>Catharus guttatus</i>	Hermit Thrush	M	N
Thrushes	Turdidae	<i>Turdus migratorius</i>	American Robin	PR	N
Thrushes	Turdidae	<i>Sialia sialis</i>	Eastern Bluebird	PR	N
Mockingbirds and Thrashers	Mimidae	<i>Dumetella carolinensis</i>	Gray Catbird	B,M	N
Mockingbirds and Thrashers	Mimidae	<i>Mimus polyglottos</i>	Northern Mockingbird	PR	N
Mockingbirds and Thrashers	Mimidae	<i>Toxostoma rufum</i>	Brown Thrasher	B,M	N
Starlings	Sturnidae	<i>Sturnus vulgaris</i>	European Starling	PR	E
Waxwings	Bombycillidae	<i>Bombycilla cedrorum</i>	Cedar Waxwing	B,M	N
Old World Sparrows	Passeridae	<i>Passer domesticus</i>	House Sparrow	PR	E
Wagtails and	Motacillidae	<i>Anthus rubescens</i>	American	M	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Pipits			Pipit		
Finches and Allies	Fringillidae	<i>Acanthis flammea</i>	Common Redpoll	A	N
Finches and Allies	Fringillidae	<i>Spinus tristis</i>	American Goldfinch	PR	N
Finches and Allies	Fringillidae	<i>Haemorhous mexicanus</i>	House Finch	PR	E
Finches and Allies	Fringillidae	<i>Haemorhous purpureus</i>	Purple Finch	M,W	N
Wood-warbler	Parulidae	<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	M	N
Wood-warbler	Parulidae	<i>Dendroica castanae</i>	Bay-breasted Warbler	M	N
Wood-warbler	Parulidae	<i>Dendroica cerulea</i>	Cerulean Warbler	B,M	N
Wood-warbler	Parulidae	<i>Dendroica coronata</i>	Yellow-rumped Warbler	M,W	N
Wood-warbler	Parulidae	<i>Dendroica discolor</i>	Prairie Warbler	M,SR	N
Wood-warbler	Parulidae	<i>Dendroica dominica</i>	Yellow-throated Warbler	B,M	N
Wood-warbler	Parulidae	<i>Dendroica magnolia</i>	Magnolia Warbler	M	N
Wood-warbler	Parulidae	<i>Dendroica palmarum</i>	Yellow Palm Warbler	M	N
Wood-warbler	Parulidae	<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler	M	N
Wood-warbler	Parulidae	<i>Dendroica petechia</i>	Yellow Warbler	B,M	N
Wood-warbler	Parulidae	<i>Dendroica striata</i>	Blackpoll Warbler	M	N
Wood-warbler	Parulidae	<i>Dendroica virens</i>	Black-throated Green Warbler	B,M	N
Wood-warbler	Parulidae	<i>Geothlypis trichas</i>	Common Yellowthroat	B,M	N
Wood-warbler	Parulidae	<i>Icteria virens</i>	Yellow-breasted Chat	B,M	N
Wood-warbler	Parulidae	<i>Mniotilta varia</i>	Black and White Warbler	B,M	N
Wood-warbler	Parulidae	<i>Oporornis formosus</i>	Kentucky Warbler	B,M	N
Wood-warbler	Parulidae	<i>Oporornis philadelphia</i>	Mourning Warbler	M	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Wood-warbler	Parulidae	<i>Parula americana</i>	Northern Parula	B,M	N
Wood-warbler	Parulidae	<i>Protonotaria citrea</i>	Prothonotary Warbler	B,M	N
Wood-warbler	Parulidae	<i>Seiurus aurocapillus</i>	Ovenbird	B,M	N
Wood-warbler	Parulidae	<i>Seiurus motacilla</i>	Louisiana Waterthrush	B,M	N
Wood-warbler	Parulidae	<i>Seiurus noveboracensis</i>	Northern Waterthrush	M	N
Wood-warbler	Parulidae	<i>Setophaga ruticilla</i>	American Redstart	B,M	N
Wood-warbler	Parulidae	<i>Vermivora peregrina</i>	Tennessee Warbler	M	N
Wood-warbler	Parulidae	<i>Oreothlypis celata</i>	Orange-crowned Warbler	A	N
Wood-warbler	Parulidae	<i>Vermivora ruficapilla</i>	Nashville Warbler	M	N
Wood-warbler	Parulidae	<i>Wilsonia citrina</i>	Hooded Warbler	B,M	N
Wood-warbler	Parulidae	<i>Wilsonia pusilla</i>	Wilson's Warbler	M	N
Wood-warblers	Parulidae	<i>Vermivora pinus</i>	Blue-winged Warbler	B,M	N
Sparrows and Allies	Emberizidae	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	M,SR	N
Sparrows and Allies	Emberizidae	<i>Ammodramus leconteii</i>	Le Conte's Sparrow	A	N
Sparrows and Allies	Emberizidae	<i>Ammodramus nelsoni</i>	Nelson's Sparrow	A	N
Sparrows and Allies	Emberizidae	<i>Melospiza georgiana</i>	Swamp Sparrow	PR	N
Sparrows and Allies	Emberizidae	<i>Melospiza lincolnii</i>	Lincoln's Sparrow	M	N
Sparrows and Allies	Emberizidae	<i>Melospiza melodia</i>	Song Sparrow	PR	N
Sparrows and Allies	Emberizidae	<i>Passerculus sandwichensis</i>	Savannah Sparrow	M,SR	N
Sparrows and Allies	Emberizidae	<i>Passerella iliaca</i>	Fox Sparrow	W	N
Sparrows and Allies	Emberizidae	<i>Pooecetes gramineus</i>	Vesper Sparrow	M,SR	N
Sparrows and Allies	Emberizidae	<i>Spizella arborea</i>	American Tree Sparrow	M,W	N
Sparrows and Allies	Emberizidae	<i>Spizella passerina</i>	Chipping Sparrow	M,SR	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>RESIDENCE *</b>	<b>ORIGIN **</b>
Sparrows and Allies	Emberizidae	<i>Spizella pallida</i>	Clay colored sparrow	M	N
Sparrows and Allies	Emberizidae	<i>Spizella pusilla</i>	Field Sparrow	B,M	N
Sparrows and Allies	Emberizidae	<i>Zonotrichia albicollis</i>	White-throated Sparrow	M,W	N
Sparrows and Allies	Emberizidae	<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	M,W	N
Sparrows and Allies	Emberizidae	<i>Junco hyemalis</i>	Dark-eyed Junco	W	N
Sparrows and Allies	Emberizidae	<i>Pipilo erythrophthalmus</i>	Eastern Towhee	PR	N
Cardinals and Allies	Cardinalidae	<i>Passerina cyanea</i>	Indigo Bunting	B,M	N
Cardinals and Allies	Cardinalidae	<i>Cardinalis cardinalis</i>	Northern Cardinal	PR	N
Cardinals and Allies	Cardinalidae	<i>Guiraca caerulea</i>	Blue Grosbeak	B,M	N
Cardinals and Allies	Cardinalidae	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	B,M	N
Cardinals and Allies	Cardinalidae	<i>Piranga olivacea</i>	Scarlet Tanager	B,M	N
Cardinals and Allies	Cardinalidae	<i>Piranga rubra</i>	Summer Tanager	B,M	N
Cardinals and Allies	Cardinalidae	<i>Spiza americana</i>	Dickcissel	M	N
Blackbirds	Icteridae	<i>Agelaius phoeniceus</i>	Red-winged Blackbird	PR	N
Blackbirds	Icteridae	<i>Dolichonyx orizivorus</i>	Bobolink	M	N
Blackbirds	Icteridae	<i>Euphagus carolinus</i>	Rusty Blackbird	M,W	N
Blackbirds	Icteridae	<i>Molothrus ater</i>	Brown-headed Cowbird	PR	N
Blackbirds	Icteridae	<i>Quiscalus quiscula</i>	Common Grackle	PR	N
Blackbirds	Icteridae	<i>Sturnella magno</i>	Eastern Meadowlark	PR	N
Blackbirds	Icteridae	<i>Icterus galbula</i>	Baltimore Oriole	B,M	N
Blackbirds	Icteridae	<i>Icterus spurius</i>	Orchard Oriole	B,M	N

\* B = breeding; PR = permanent resident (also breeds here); M = migration; W = wintering; SR = summer resident (no breeding records in Refuge habitats); A = accidental      \*\* N = native; E = exotic

## Refuge Fishes

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>Status</b>	<b>Origin *</b>
Amiidae	<i>Amia calva</i>	Bowfin		N
Anguillidae	<i>Anguilla rostrata</i>	American Eel		N
Atherinidae	<i>Labidesthes sicculus</i>	Brook Silverside		N
Catastomidae	<i>Cycleptus elongatus</i>	Blue Sucker		N
Catostomidae	<i>Carpiodes velifer</i>	Highfin Carpsucker		N
Catostomidae	<i>Carpoides carpio</i>	River carpsucker		N
Catostomidae	<i>Carpoides cyprinus</i>	Quillback		N
Catostomidae	<i>Catostomus commersoni</i>	White Sucker		N
Catostomidae	<i>Hypentelium nigricans</i>	Northern Hogsucker		N
Catostomidae	<i>Ictiobus bubalus</i>	Smallmouth Buffalo		N
Catostomidae	<i>Ictiobus cyprinellus</i>	Bigmouth Buffalo		N
Catostomidae	<i>Ictiobus niger</i>	Black Buffalo		N
Catostomidae	<i>Minytrema melanops</i>	Spotted Sucker		N
Catostomidae	<i>Moxostoma anisurum</i>	Silver Redhorse		N
Catostomidae	<i>Moxostoma carinatum</i>	River Redhorse		N
Catostomidae	<i>Moxostoma duquesnei</i>	Black Redhorse		N
Catostomidae	<i>Moxostoma erythrurum</i>	Golden Redhorse		N
Catostomidae	<i>Moxostoma macrolepidotum</i>	Shorthead Redhorse		N
Centarchidae	<i>Lepomis gibbosus</i>	Pumpkinseed		N
Centrarchidae	<i>Ambloplites rupestris</i>	Rock Bass		N
Centrarchidae	<i>Lepomis cyanellus</i>	Green Sunfish		N
Centrarchidae	<i>Lepomis gulosus</i>	Warmouth		N
Centrarchidae	<i>Lepomis humilis</i>	Orangespotted Sunfish		N
Centrarchidae	<i>Lepomis hybrid</i>	Hybrid		E
Centrarchidae	<i>Lepomis macrochirus</i>	Bluegill		N
Centrarchidae	<i>Lepomis megalotis</i>	Longear Sunfish		N
Centrarchidae	<i>Lepomis microlophus</i>	Redear Sunfish		N
Centrarchidae	<i>Micropterus dolomieu</i>	Smallmouth Bass		N
Centrarchidae	<i>Micropterus punctulatus</i>	Largemouth Bass		N
Centrarchidae	<i>Micropterus punctulatus</i>	Spotted Bass		N
Centrarchidae	<i>Poxomis annularis</i>	White Crappie		N
Centrarchidae	<i>Poxomis nigromaculatus</i>	Black Crappie		N
Characidae	<i>Carassius auratus</i>	Goldfish		E
Clupeidae	<i>Alosa chrysochloris</i>	Skipjack Herring		N
Clupeidae	<i>Alosa pseudohargengus</i>	Alewife		N
Clupeidae	<i>Dorosoma cepedianum</i>	Gizzard Shad		N
Clupeidae	<i>Dorosoma petenense</i>	Threadfin Shad		N
Cyprinidae	<i>Campostoma anomalum</i>	Central Stoneroller		N
Cyprinidae	<i>Carassius auratus X Cyprinus</i>	Goldfish Hybrid		E
Cyprinidae	<i>Cyprinella galactura</i>	Whitetail Shiner		N
Cyprinidae	<i>Cyprinus carpio</i>	Common Carp		E
Cyprinidae	<i>Ericymba buccata</i>	Silverjaw Minnow		N
Cyprinidae	<i>Hybopsis storeriana</i>	Silver Chub		N

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>Status</b>	<b>Origin *</b>
Cyprinidae	<i>Luxilus cornutus</i>	Common Shiner		N
Cyprinidae	<i>Nocomis micropogon</i>	River Chub		N
Cyprinidae	<i>Notemigonus crysoleucas</i>	Golden Shiner		N
Cyprinidae	<i>Notropis antherinoides</i>	Emerald Shiner		N
Cyprinidae	<i>Notropis blennioides</i>	River Shiner		N
Cyprinidae	<i>Notropis boops</i>	Bigeye Shiner		N
Cyprinidae	<i>Notropis chrysocephalus</i>	Striped Shiner		N
Cyprinidae	<i>Notropis hudsonius</i>	Spotail Shiner		N
Cyprinidae	<i>Notropis photogenis</i>	Silver Shiner		N
Cyprinidae	<i>Notropis rubellus</i>	Rosyface Shiner		N
Cyprinidae	<i>Notropis spilopterus</i>	Spotfin Shiner		N
Cyprinidae	<i>Notropis stramineus</i>	Sand Shiner		N
Cyprinidae	<i>Notropis volucellus</i>	Mimic Shiner		N
Cyprinidae	<i>Notropis wickliffi</i>	Channel Shiner		N
Cyprinidae	<i>Phenacobius mirabilis</i>	Suckermouth Minnow		N
Cyprinidae	<i>Pimephales notatus</i>	Bluntnose Minnow		N
Cyprinidae	<i>Pimephales promelas</i>	Fathead Minnow		N
Cyprinidae	<i>Pimephales vigilax</i>	Bullhead Minnow		N
Cyprinidae	<i>Rhinichthys atratulus</i>	Blacknose Dace		N
Cyprinidae	<i>Semotilus atromaculatus</i>	Creek Chub		N
Esocidae	<i>Esox lucius</i>	Northern Pike		N
Esocidae	<i>Esox lucius X masquinongy</i>	Tiger musky hybrid		E
Esocidae	<i>Esox masquinongy</i>	Muskellunge		N
Hiodontidae	<i>Hiodon alosoides</i>	Goldeye		N
Hiodontidae	<i>Hiodon tergisus</i>	Mooneye		N
Ictaluridae	<i>Ameiurus natalis</i>	Yellow Bullhead		N
Ictaluridae	<i>Ameiurus nebulosus</i>	Brown Bullhead		N
Ictaluridae	<i>Ameiurus melas</i>	Black Bullhead		N
Ictaluridae	<i>Ictalurus furcatus</i>	Blue catfish		N
Ictaluridae	<i>Ictalurus punctatus</i>	Channel Catfish		N
Ictaluridae	<i>Pylodictis olivaris</i>	Flathead Catfish		N
Lepisosteidae	<i>Lepisosteus osseus</i>	Longnose Gar		N
Lepisosteidae	<i>Lepisosteus platostomus</i>	Shortnose Gar		N
Moronidae	<i>Morone americana</i>	White Perch		N
Moronidae	<i>Morone chrysops</i>	White Bass		N
Moronidae	<i>Morone chrysops X saxatilis</i>	Hybrid striped bass		E
Moronidae	<i>Morone saxatilis</i>	Striped Bass		E
Percidae	<i>Etheostoma blennioides</i>	Greenside Darter		N
Percidae	<i>Etheostoma caeruleum</i>	Rainbow Darter		N
Percidae	<i>Etheostoma camurum</i>	Bluebreast Darter		N
Percidae	<i>Etheostoma flabellare</i>	Fantail Darter		N
Percidae	<i>Etheostoma nigrum</i>	Johnny Darter		N
Percidae	<i>Etheostoma zonale</i>	Banded Darter		N
Percidae	<i>Perca flavescens</i>	Yellow perch		N
Percidae	<i>Percina caprodes</i>	Logperch		N
Percidae	<i>Percina copelandi</i>	Channel Darter		N

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>Status</b>	<b>Origin *</b>
Percidae	<i>Percina maculata</i>	Blackside Darter		N
Percidae	<i>Percina phoxocephala</i>	Slenderhead Darter		N
Percidae	<i>Percina sciera</i>	Dusky Darter		N
Percidae	<i>Percina shumardi</i>	River Darter		N
Percidae	<i>Stizostedion canadense</i>	Sauger		N
Percidae	<i>Stizostedion vitreum</i>	Walleye		N
Percopsidae	<i>Percopsis spp.</i>	Trout Perch		N
Petromyzontidae	<i>Ichthyomyzon bdellium</i>	Ohio Lamprey		N
Petromyzontidae	<i>Ichthyomyzon unicupsis</i>	Silver Lamprey		N
Petromyzontidae	<i>Lampetra appendix</i>	American Brook Lamprey		N
Polyodontidae	<i>Polyodon spathula</i>	Paddlefish		N
Salmonidae	<i>Oncorhynchus mykiss</i>	Rainbow trout		E, S
Salmonidae	<i>Salvelinus fontinalis</i>	Brook trout		N, S
Salmonidae	<i>Salmo trutta</i>	Brown Trout		E, S
Sciaenidae	<i>Aplodinotus grunniens</i>	Freshwater Drum		N

\* N = Native; E = Exotic; S = Stocked in tributary systems

Refuge Insects 2016

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Bees – Plasterer Bees	Colletidae	<i>Hylaeus mesillae</i>	No common name	N
Bees – Plasterer Bees	Colletidae	<i>Hylaeus modestus</i>	Yellow- faced bee	N
Bees – Plasterer Bees	Colletidae	<i>Hylaeus affinis</i>	No common name	N
Bees – Plasterer Bees	Colletidae	<i>Colletes compactus</i>	No common name	N
Bees – Plasterer Bees	Colletidae	<i>Colletes inaequalis</i>	Unequal cellophane bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Agapostemon virescens</i>	Green bee; bicolor sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Augochlora pura</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Augochlorella aurata</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Augochloropsis metallica</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Halictus confusus</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Halictus ligatus</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Halictus rubicundus</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum coriaceum</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum fattigi/apocyni</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum imitatum</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum rohweri</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum viridatum</i>	Sweat bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum admirandum</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum bruneri</i>	Bruner's dialictus	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum ephialtum</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum foxii</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum gotham</i>	Gotham bee	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum hitchensi</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum leatherinae</i> ??	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum obscurum</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum pectorale</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum smilacinae</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum subviridatum</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum timothyi</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum versatum</i>	No common name	N
Bees - Halictid and Sweat Bees	Halictidae	<i>Lasioglossum weemsi</i>	No common name	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia atriventris</i>	No common name	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia bucephala</i>	Bufflehead mason bee	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia collinsiae</i>	No common name	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia conjuncta</i>	No common name	N
Bees - Leafcutting Bees, Mason	Megachilidae	<i>Osmia georgica</i>	No common name	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Bees				
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia lignaria</i>	Blue orchard bee	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia pumila</i>	No common name	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Osmia taurus</i>	No common name	N
Bees - Leafcutting Bees, Mason Bees	Megachilidae	<i>Hoplitis pilosifrons</i>	No common name	N
Bees - Leafcutting Bees, Mason bees	Megachilidae	<i>Megachile mendica</i>	Flat tailed Leaf cutter bee	N
Bees - Leafcutting Bees, Mason bees	Megachilidae	<i>Coelioxys sayi</i>	Say's cuckoo leaf cutter	N
Bees - Long-tongued Bees	Apidae	<i>Bombus impatiens</i>	Bumble bee	N
Bees - Long-tongued Bees	Apidae	<i>Bombus griseocollis</i>	Brown belted bumble bee	N
Bees - Long-tongued Bees	Apidae	<i>Bombus auricomus</i>	Black-and-gold Bumble Bee	N
Bees - Long-tongued Bees	Apidae	<i>Eucera atriventris</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Eucera dubitata</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Apis mellifera</i>	Honey bee	E
Bees - Long-tongued Bees	Apidae	<i>Melissodes denticulata</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Melissodes bimaculata</i>	Long-horned bee	N
Bees - Long-tongued Bees	Apidae	<i>Melissodes desponsa</i>	Thistle long-horned bee	N
Bees - Long-tongued Bees	Apidae	<i>Melissodes druriella</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Nomada bidentate</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Nomada pygmaea</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Nomada sulphurata</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Nomada superba</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Melitoma taurea</i>	No common name	N
Bees - Long-tongued Bees	Apidae	<i>Ceratina calcarata</i>	Small carpenter bee	N
Bees - Long-tongued Bees	Apidae	<i>Ceratina dupla</i>	Small carpenter bee	N
Bees - Long-tongued Bees	Apidae	<i>Ceratina mikmaqi</i>	Small carpenter bee	N
Bees - Long-tongued Bees	Apidae	<i>Ceratina strenua</i>	Small carpenter bee	N
Bees - Long-tongued Bees	Apidae	<i>Xylocopa virginica</i>	Northern carpenter bee	N
Bees - Long-tongued Bees	Apidae	<i>Peponapis pruinosa</i>	Pruinose squash bee	N
Bees - Mining Bees	Andrenidae	<i>Calliopsis andreniformis</i>	Miner bee	N
Bees - Mining Bees	Andrenidae	<i>Andrena carlini</i>	Carlin's Andrena	N
Bees - Mining Bees	Andrenidae	<i>Andrena imitatrix</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Andrena miserabilis</i>	Miserable Adrena	N
Bees - Mining Bees	Andrenidae	<i>Andrena nasonii</i>	Nason's Adrena	N
Bees - Mining Bees	Andrenidae	<i>Andrena placata</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Andrena vicina</i>	Neighborly Adrena	N
Bees - Mining Bees	Andrenidae	<i>Andrena cressonii</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Andrena erigeniae</i>	Spring beauty Adrena	N
Bees - Mining Bees	Andrenidae	<i>Andrena erythronii</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Andrena hirticineta</i>	Hairy-banded Adrena	N

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Bees - Mining Bees	Andrenidae	<i>Andrena illini</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Andrena arabis</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Andrena asteris</i>	Aster Adrena	N
Bees - Mining Bees	Andrenidae	<i>Andrena violae</i>	No common name	N
Bees - Mining Bees	Andrenidae	<i>Pseudopanurgus compositarum</i>	No common name	N
Beetles - Blister Beetles	Meloidae	<i>Epicauta pennsylvanica</i>	Black blister beetle	N
Beetles - Ladybird Beetles	Coccinellidae	<i>Harmonia axyridis</i>	Asian ladybird beetle	N
Beetles - Ladybird Beetles	Coccinellidae	<i>Coccinella septempunctata</i>	Six-spotted ladybird beetle	N
Beetles - leaf Beetles	Chrysomelidae	<i>Labidomera clivicollis</i>	Swamp milkweed leaf beetle	N
Beetles - leaf Beetles	Chrysomelidae	<i>Chrysochus auratus</i>	Dogbane leaf beetle	N
Beetles - Long-horned Beetles	Cerambycidae	<i>Megacyllene robiniae</i>	Black locust borer	N
Beetles - Sap Beetles	Nitidulidae	<i>Carpophilus sp.</i>	Sap beetle sp.	N
Beetles - Scarab Beetles	Scarabaeidae	<i>Popillia japonica</i>	Japanese beetle	N
Beetles - Soldier Beetles	Cantharidae	<i>Chauliognathus pennsylvanicus</i>	Goldenrod Leatherwing	N
Beetles - Tiger Beetles	Carabidae	<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	N
Beetles - Tiger Beetles	Carabidae	<i>Cicindela repanda</i>	Bronzed Tiger Beetle	N
Beetles - Tiger Beetles	Carabidae	<i>Cicindela cuprascens</i>	Coppery Tiger Beetle	N
Butterflies - Brushfoots	Nymphalidae	<i>Junonia coenia</i>	Common Buckeye	N
Butterflies - Brushfoots	Nymphalidae	<i>Speyeria cybele</i>	Great Spangled Fritillary	N
Butterflies - Brushfoots	Nymphalidae	<i>Asterocampa celtis</i>	Hackberry Emperor	N
Butterflies - Brushfoots	Nymphalidae	<i>Boloria bellona</i>	Meadow Fritillary	N
Butterflies - Brushfoots	Nymphalidae	<i>Danaus plexippus</i>	Monarch	N
Butterflies - Brushfoots	Nymphalidae	<i>Phyciodes tharos</i>	Pearl Crescent	N
Butterflies - Brushfoots	Nymphalidae	<i>Polygonia interrogationis</i>	Question Mark	N
Butterflies - Brushfoots	Nymphalidae	<i>Vanessa atalanta</i>	Red Admiral	N
Butterflies - Brushfoots	Nymphalidae	<i>Chlosyne nycteis</i>	Silvery Checkerspot	N
Butterflies - Brushfoots	Nymphalidae	<i>Euptoieta claudia</i>	Variiegated Fritillary	N
Butterflies - Brushfoots	Nymphalidae	<i>Speyeria atlantis</i>	Atlantis Fritillary	N
Butterflies - Brushfoots	Nymphalidae	<i>Limenitis archippus</i>	Viceroy	N
Butterflies - Brushfoots	Nymphalidae	<i>Enodia anthedon</i>	Northern pearly-eye	N
Butterflies - Grass Skippers	Hesperiidae	<i>Lerema accius</i>	Clouded Skipper	N
Butterflies - Grass Skippers	Hesperiidae	<i>Hesperiidae spp.</i>	Dun Dusky Skipper	N
Butterflies - Grass Skippers	Hesperiidae	<i>Thymelicus lineola</i>	European Skipper	N
Butterflies - Grass Skippers	Hesperiidae	<i>Ancyloxypha numitor</i>	Least Skipper	N
Butterflies - Grass Skippers	Hesperiidae	<i>Polites peckius</i>	Peck's Skipper	N
Butterflies - Grass Skippers	Hesperiidae	<i>Poanes zabalun</i>	Zabalun Skipper	N
Butterflies - Hairstreaks, & Blues	Lycaenidae	<i>Satyrium calanus</i>	Banded Hairstreak	N
Butterflies - Hairstreaks, & Blues	Lycaenidae	<i>Satyrium titus</i>	Coral Hairstreak	N
Butterflies - Hairstreaks, &	Lycaenidae	<i>Everes comyntas</i>	Eastern Tailed-Blue	N

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Blues		<i>comyntas</i>		
Butterflies - Hairstreaks, & Blues	Lycaenidae	<i>Satyrium caryaevorus</i>	Hickory Hairstreak	N
Butterflies - Hairstreaks, & Blues	Lycaenidae	<i>Celastrina ladon</i>	Spring Azure	N
Butterflies - Spread-wing Skippers	Hesperiidae	<i>Pholisora catullus</i>	Common Sootywing	N
Butterflies - Spread-wing Skippers	Hesperiidae	<i>Epargyreus clarus</i>	Silver-spotted Skipper	N
Butterflies - Swallowtails	Papilionidae	<i>Papilio polyxenes</i>	Black Swallowtail	N
Butterflies - Swallowtails	Papilionidae	<i>Papilio glaucus</i>	Eastern Tiger Swallowtail	N
Butterflies - Swallowtails	Papilionidae	<i>Battus philenor</i>	Pipevine Swallowtail	N
Butterflies - Swallowtails	Papilionidae	<i>Papilio troilus</i>	Spicebush Swallowtail	N
Butterflies - Swallowtails	Papilionidae	<i>Eurytides marcellus</i>	Zebra Swallowtail	N
Butterflies - Whites, Sulphurs	Pieridae	<i>Pontia rapae</i>	Cabbage Butterfly	E
Butterflies - Whites, Sulphurs	Pieridae	<i>Colias philodice philodice</i>	Clouded Sulphur	N
Butterflies - Whites, Sulphurs	Pieridae	<i>Phoebis sennae eubule</i>	Cloudless Sulphur	N
Butterflies - Whites, Sulphurs	Pieridae	<i>Colias eurytheme</i>	Orange Sulphur	N
Damselflies	Coenagrionidae	<i>Argia apicalis</i>	Blue-fronted Dancer	N
Damselflies	Coenagrionidae	<i>Argia translata</i>	Dusky Dancer	N
Dragonflies	Libellulidae	<i>Perithemis ternera</i>	Eastern Amberwing	N
Dragonflies	Gomphidae	<i>Stylurus notatus</i>	Elusive Clubtail	N
Dragonflies	Gomphidae	<i>Hagenius brevistylus</i>	Dragonhunter	N
Dragonflies	Macromiidae	<i>Macromia taeniolata</i>	Royal River Cruiser	N
Flies - Fruit Flies	Tephritidae	<i>Eurosta sp.</i>	Goldenrod gall fly sp.	N
Flies - Hoverflies	Syrphidae	<i>Eristalis dimidiatus</i>	Sphyrid (hover) fly sp.	N
Flies - Hoverflies	Syrphidae	<i>Baccha costata/Allograpta obliqua</i>	Syrphid (hover) fly sp.	N
Flies - Robber Flies	Asilidae	<i>Holcocephala fusca</i>	Robber fly sp.	N
Grasshoppers, Crickets, and Katydid	Gryllidae	<i>Phyllopalpus pulchellus</i>	Red-headed bush cricket	N
Mantid Flies	Mantispidae	<i>sp.</i>	Mantid fly sp.	N
Mantises	Mantidae	<i>Tenodera sinensis</i>	Chinese mantis	E
Millipedes	Spirobolidae	<i>Narceus americanus</i>	North American millipede	N
Moths - Ermine Moths	Yponomeutidae	<i>Atteva aurea</i>	Ailanthus webworm	N
Moths - Crambid Snout Moths	Crambidae	<i>Concylodes ovulalis</i>	Zebra Concylodes	N
Moths - Crambid Snout Moths	Crambidae	<i>Crambus agitatellus</i>	Double-banded Grass-veener	N
Moths - Crambid Snout Moths	Crambidae	<i>Desmia funeralis/maculalis</i>	Grape Leaf folder	N
Moths - Crambid Snout Moths	Crambidae	<i>Fissicrambus mutabilis</i>	Changeable Grass-veener	N
Moths - Crambid Snout Moths	Crambidae	<i>Haimbachia placidellus</i>	Peppered Haimbacia	N
Moths - Crambid Snout Moths	Crambidae	<i>Microcrambus elegans</i>	Elegant Grass-veener	N

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Moths – Crambid Snout Moths	Crambidae	<i>Nomophila nearctica</i>	Lucerne Moth	N
Moths – Crambid Snout Moths	Crambidae	<i>Pantographa limata</i>	Basswood Leafroller	N
Moths – Crambid Snout Moths	Crambidae	<i>Parapediasia teterrella</i>	Bluegrass Webworm	N
Moths – Crambid Snout Moths	Crambidae	<i>Udea rubigalis</i>	Celery Leaf-tier	N
Moths – Erebid Moths	Erebidae	<i>Allotria elonympha</i>	False Underwing	N
Moths – Erebid Moths	Erebidae	<i>Apantesis phalerata</i>	Harnessed Tiger Moth	N
Moths – Erebid Moths	Erebidae	<i>Caenurgina erechtea</i>	Forage Looper	N
Moths – Erebid Moths	Erebidae	<i>Condica vecors</i>	Dusky Groundling	N
Moths – Erebid Moths	Erebidae	<i>Cycnia tenera</i>	Delicate Cycnia	N
Moths – Erebid Moths	Erebidae	<i>Halysidota tessellaris</i>	Banded Tussock Moth	N
Moths – Erebid Moths	Erebidae	<i>Hypena baltimoralis</i>	Baltimore Snout	N
Moths – Erebid Moths	Erebidae	<i>Idia aemula</i>	Common Idia	N
Moths – Erebid Moths	Erebidae	<i>Panopoda carneicosta</i>	Brown Panopoda	N
Moths – Erebid Moths	Erebidae	<i>Parallelia bistrariis</i>	Maple Looper Moth	N
Moths – Erebid Moths	Erebidae	<i>Pyrrharctica isabella</i>	Isabella Tiger Moth	N
Moths – Erebid Moths	Erebidae	<i>Spilosoma congrua</i>	Agreeable Tiger Moth	N
Moths – Erebid Moths	Erebidae	<i>Zale horrida</i>	Horrid Zale	N
Moths – Erebid Moths	Erebidae	<i>Zale undularis</i>	Black Zale	N
Moths – Erebid Moths	Erebidae	<i>Zanclognatha crucialis</i>	Early Fan-foot	N
Moths – Erebid Moths	Erebidae	<i>Zanclognatha marcidilinea</i>	Yellowish Fan-foot	N
Moths - Gelechiid Moths	Gelechiidae	<i>Gnorimoschema sp.</i>	Moth sp.	N
Moths – Geometrid Moths	Geometridae	<i>Besma quercivoria</i>	Oak Besma	N
Moths – Geometrid Moths	Geometridae	<i>Biston betularia</i>	Pepper-and-salt Geometer	N
Moths – Geometrid Moths	Geometridae	<i>Cabera variolaria</i>	The Vestal	N
Moths – Geometrid Moths	Geometridae	<i>Digrammia ocellinata</i>	Faint-spotted Anglewing	N
Moths – Geometrid Moths	Geometridae	<i>Ectropis crepuscularia</i>	Small Engrailed	N
Moths – Geometrid Moths	Geometridae	<i>Epimecis hortaria</i>	Tulip Tree Beauty	N
Moths – Geometrid Moths	Geometridae	<i>Eubaphe mendica</i>	The Beggar	N
Moths – Geometrid Moths	Geometridae	<i>Eulithis diversilinet</i>	Lesser Grapevine Looper	N
Moths – Geometrid Moths	Geometridae	<i>Hygagytris unipunctata</i>	One-spotted Variant	N
Moths – Geometrid Moths	Geometridae	<i>Iridopsis ephyraria</i>	Pale-winged Gray	N
Moths – Geometrid Moths	Geometridae	<i>Iridopsis larvaria</i>	Bent-line Gray	N
Moths – Geometrid Moths	Geometridae	<i>Iridopsis vellivolata</i>	Purplish Gray	N
Moths – Geometrid Moths	Geometridae	<i>Nemoria lixaria</i>	Red-bordered Emerald	N
Moths – Geometrid Moths	Geometridae	<i>Plagodis alcoorlaria</i>	Hollow-spotted Plagodis	N
Moths – Geometrid Moths	Geometridae	<i>Pleuroprucha insulsaria</i>	Common Tan Wave	N
Moths – Geometrid Moths	Geometridae	<i>Xanthorhoe lacustrata</i>	Toothed Brown Carpet	N
Moths – Geometrid Moths	Geometridae	<i>Xanthotype urticaria</i>	False Crocus Geometer	N
Moths – Giant Silkmoths	Saturniidae	<i>Antheracea polyphemus</i>	Polyphemus Moth	N
Moths – Giant Silkmoths	Saturniidae	<i>Dryocampa rubicunda</i>	Rosy Maple Moth	N
Moths – Giant Silkmoths	Saturniidae	<i>Eacles imperialis</i>	Imperial Moth	N
Moths – Giant Silkmoths	Saturniidae	<i>Anisota senatoria</i>	Orange striped	N

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			oakworm	
Moths – Sphinx Moths	Sphingidae	<i>Darapsa myron</i>	Virginia Creeper Sphinx	N
Moths – Sphinx Moths	Sphingidae	<i>Paonias myops</i>	Small-eyed Sphinx	N
Moth – Slug moths	Limacodidae	<i>Isochaetes beutenmuelleri</i>	Spun Glass Slug Moth	N
Moth – Slug moths	Limacodidae	<i>Parasa chloris</i>	Smaller Parasa	N
Moth – Slug moths	Limacodidae	<i>Prolimacodes badia</i>	Skiff Moth	N
Moths - Tent Caterpillars	Lasiocampidae	<i>Malacosoma americanum</i>	Eastern tent caterpillar	N
Moths – Owlet moths	Noctuidae	<i>Acronicta ovata</i>	Ovate	N
Moths – Owlet moths	Noctuidae	<i>Allagrapha aerea</i>	Unspotted Looper	N
Moths – Owlet moths	Noctuidae	<i>Elaphria grata</i>	Grateful Midget	N
Moths – Owlet moths	Noctuidae	<i>Eudryas grata</i>	Beautiful Wood Nymph	N
Moths – Owlet moths	Noctuidae	<i>Leuconycta diphteroides</i>	Green Leuconycta	N
Moths – Owlet moths	Noctuidae	<i>Lithacodia musta</i>	Small Mossy Glyph	N
Moths – Owlet moths	Noctuidae	<i>Marimatha nigrofimbria</i>	Black-bordered Lemon	N
Moths – Owlet moths	Noctuidae	<i>Mythimna unipunctata</i>	The White-speck	N
Moths – Owlet moths	Noctuidae	<i>Polygrammate hebraeicum</i>	The Hebrew	N
Moths – Owlet moths	Noctuidae	<i>Protodeltodes muscosula</i>	Large Mossy Glyph	N
Moths – Owlet moths	Noctuidae	<i>Spragueia leo</i>	Common Spragueia	N
Moths – Owlet moths	Noctuidae	<i>Xestia c-nigrum/dolosa</i>	Black-letter Dart	N
Moths – Owlet moths	Noctuidae	<i>Psychomorpha epimenis</i>	Grapevine Epimenis	N
Moth – Prominent Moths	Notodontidae	<i>Gluphisia septentrionis</i>	Common Gluphisia	N
Moths - Tiger Moths	Arctiidae	<i>Cisseps fulvicollis</i>	Yellow Collared Scape Moth	N
Moths - Tiger moths	Arctiidae	<i>Halysidota tessellaris</i>	Banded tussock moth	N
Moth – Tube moths	<u>Acrolophidae</u>	<i>Acrolophus popeanella</i>	Clemen's tube moth	N
Moth – Tortricid moths	Tortricidae	<i>Acleris nivisellana</i>	Snowy-shouldered Acleris	N
Moth – Tortricid moths	Tortricidae	<i>Clepsis veritata</i>	Garden Tortrix	N
Moth – Tortricid moths	Tortricidae	<i>Platynoda flavedana</i>	Black-shaded Platynoda	N
True Bugs - Aphids	Aphidae	<i>Aphis nerii</i>	Yellow milkweed aphid	N
True Bugs - Cicadas	Cicadidae	<i>Magicicada cassini</i>	Cassini periodical cicada	N
True Bugs - Cicadas	Cicadidae	<i>Magicicada septendecula</i>	Decula periodical cicada	N
True Bugs - Cicadas	Cicadidae	<i>Magicicada septendecim</i>	Decim periodical cicada	N
True Bugs - Cicadas	Cicadidae	<i>Neotibicen pruinosus</i>	Dog-day cicada	N
True Bugs - Milkweed	Lygaeidae	<i>Oncopeltus fasciatus</i>	Large milkweed bug	N
True Bugs - Milkweed	Lygaeidae	<i>Lygaeus kalmii</i>	Small milkweed bug	N
True Bugs - Spittlebugs	Cercopidae	<i>sp.</i>	Spittlebug sp.	N
True Bugs - Stink Bugs	Pentatomidae	<i>Acrosternum hilare</i>	Green stink bug	N
True Bugs - Stink Bugs	Pentatomidae	<i>Brochymena quadripustulata</i>	Fourhumped stink bug	N
True Bugs - Stink Bugs	Pentatomidae	<i>Thyanta accerra</i>	Redshouldered stink bug	N
True Bugs - Stink Bugs	Pentatomidae	<i>Brochymena sp.</i>	Stink Bug	N

<b>GROUP</b>	<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
True Bugs - Stink Bugs	Pentatomidae	<i>Halyomorpha halys</i>	Brown marmorated stink bug	E
True Bugs - Treehoppers	Membracidae	<i>Publilia reticulata</i>	Treehopper Bug	N
True Bugs - Wheel bug	Reduviidae	<i>Arilus cristatus</i>	Wheel bug; assassin bug	N
Wasps	Crabronidae	<i>Trypoxylon sp.</i>	Wasp sp.	N
Wasps - Gall	Cynipidae	<i>sp.</i>	Gall wasp sp.	N
Wasps - Wood wasps	Siricidae	<i>Tremex columba</i>	Pigeon tremex horntail	N
Wasps - Mud Daubers, Sphecid Wasps	Sphecidae	<i>Chalybion californicum</i>	Blue mud dauber	N
Wasps - Mud Daubers, Sphecid Wasps	Sphecidae	<i>Ammophila sp.</i>	Thread-waisted wasp sp.	N
Wasps	Sphecidae	<i>Sphex pensylvanicus</i>	Great Black Wasp	N
Wasps - Scoliid Wasps	Scoliidae	<i>Scolia dubia</i>	Digger wasp	N
Yellowjackets, Wasps, Hornets	Vespidae	<i>Parancistrocerus pedestris</i>	Mason wasp	N
Yellowjackets, Wasps, Hornets	Vespidae	<i>Polistes fuscatus</i>	Paper wasp	N
Yellowjackets, Wasps, Hornets	Vespidae	<i>Vespula maculifrons</i>	Eastern yellow jacket	N
Yellowjackets, Wasps, Hornets	Vespidae	<i>Eumenes verticalis</i>	Potter wasp	N
Yellowjackets, Wasps, Hornets	Vespidae	<i>Eumenes fraternus</i>	Potter wasp	N

Sources: Sam Droege and Jane Whittaker bee surveys  
 Refuge insect safaris and moth nights  
 Bob Acciavatti and Courtney Kerns surveys of tiger beetles  
 WV Odonate Atlas surveys  
 WV Butterfly Atlas surveys  
 Millipedes during nighttime bat surveys  
 Moth night event species

## Refuge Mammals

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>STATUS</b>	<b>ORIGIN *</b>
Canidae	<i>Canis latrans</i>	Coyote		E
Canidae	<i>Urocyon cinereoargenteus</i>	Grey fox		N
Canidae	<i>Vulpes fulva</i>	Red fox		N
Castoridae	<i>Castor canadensis</i>	Beaver		N
Cervidae	<i>Odocoileus virginianus</i>	White-tailed deer		N
Cricetidae	<i>Microtus pennsylvanicus</i>	Meadow vole		N
Cricetidae	<i>Peromyscus leucopus</i>	White-footed mouse		N
Cricetinae	<i>Peromyscus maniculatus</i>	Deer mouse		N
Didelphiidae	<i>Didelphis marsupialis</i>	Opossum		N
Leporidae	<i>Sylvilagus floridanus</i>	Eastern cottontail rabbit		N
Microtinae	<i>Ondatra zibethicus</i>	Muskrat		N
Mustelidae	<i>Lontra canadensis</i>	River otter		N
Mustelidae	<i>Mephitis mephitis</i>	Striped skunk		N
Mustelidae	<i>Mustela erminea</i>	Short-tailed weasel		N
Mustelidae	<i>Mustela frenata</i>	Long-tailed weasel		N
Mustelidae	<i>Mustela vison</i>	Mink		N
Procyonidae	<i>Procyon lotor</i>	Raccoon		N
Sciuridae	<i>Marmota monax</i>	Woodchuck		N
Sciuridae	<i>Sciurus carolinensis</i>	Grey squirrel		N
Sciuridae	<i>Sciurus niger</i>	Fox squirrel		N
Sciuridae	<i>Tamias striatus</i>	Chipmunk		N
Soricidae	<i>Blarina brevicauda</i>	Short-tailed shrew		N
Vespertilionidae	<i>Eptesicus fuscus</i>	Big brown bat		N
Vespertilionidae	<i>Lasionycteris noctivagans</i>	Silver haired bat		N
Vespertilionidae	<i>Lasiurus borealis</i>	Eastern red bat		N
Vespertilionidae	<i>Lasiurus cinereus</i>	Hoary bat		N
Vespertilionidae	<i>Myotis leibii</i>	Eastern small footed bat		N
Vespertilionidae	<i>Myotis lucifugus</i>	Little brown bat		N
Vespertilionidae	<i>Myotis septentrionalis</i>	Northern long-eared bat	Threatened	N
Vespertilionidae	<i>Myotis sodalis</i>	Indiana bat	Endangered	N
Vespertilionidae	<i>Pipistrellus subflavus</i>	Tri-colored bat		N
Zapodidae	<i>Napaeozapus insignis</i>	Woodland jumping mouse		N
Zapodidae	<i>Zapus hudsonius</i>	Meadow jumping mouse		N

\* N = Native; E = Exotic

Refuge Plants (Trees, Shrubs, Herbaceous)

**Trees**

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Aceraceae	<i>Acer negundo</i>	Boxelder	N
Aceraceae	<i>Acer nigrum</i>	Black sugar maple	N
Aceraceae	<i>Acer rubrum</i>	Red maple	N
Aceraceae	<i>Acer saccharinum</i>	Silver maple	N
Aceraceae	<i>Acer saccharum</i>	Sugar maple	N
Anacardiaceae	<i>Rhus glabra</i>	Smooth sumac	N
Anacardiaceae	<i>Rhus typhina</i>	Staghorn sumac	N
Annonaceae	<i>Asimina triloba</i>	Paw-paw	N
Aquifoliaceae	<i>Ilex opaca</i>	American holly	N
Betulaceae	<i>Betula lenta</i>	Black birch	N
Betulaceae	<i>Betula nigra</i>	River birch	N
Bignoniaceae	<i>Catalpa bignonioides</i>	Common catalpa	E
Bignoniaceae	<i>Paulownia tomentosa</i>	Princess tree	E
Cornaceae	<i>Nyssa sylvatica</i>	Black gum	N
Cupressaceae	<i>Juniperus virginiana</i>	Red cedar	N
Cupressaceae	<i>Taxodium distichum</i>	Bald cypress	I
Ebenaceae	<i>Diospyros disyna</i>	Persimmon	N
Fabaceae	<i>Albizia julibrissin</i>	Mimosa tree	E
Fabaceae	<i>Cercis canadensis</i>	Redbud	N
Fabaceae	<i>Gleditsia tricanthos</i>	Honeylocust	N
Fabaceae	<i>Robinia pseudo-acacia</i>	Black locust	N
Fagaceae	<i>Castanea dentata</i>	American chestnut	N
Fagaceae	<i>Fagus grandifolia</i>	American beech	N
Fagaceae	<i>Quercus alba</i>	White oak	N
Fagaceae	<i>Quercus bicolor</i>	Swamp white oak	N
Fagaceae	<i>Quercus coccinea</i>	Scarlet oak	N
Fagaceae	<i>Quercus palustris</i>	Pin oak	N
Fagaceae	<i>Quercus prinus</i>	Chestnut oak	N
Fagaceae	<i>Quercus rubra</i>	Red oak	N
Fagaceae	<i>Quercus shumardii</i>	Shumard oak	N
Fagaceae	<i>Quercus velutina</i>	Black oak	N
Hamamelidaceae	<i>Liquidambar styraciflua</i>	Sweet gum	N
Hippocastanaceae	<i>Aesculus flava</i>	Sweet buckeye	N
Hippocastanaceae	<i>Aesculus glabra</i>	Ohio buckeye	N
Juglandaceae	<i>Carya cordiformis</i>	Bitternut hickory	N
Juglandaceae	<i>Carya glabra</i>	Pignut hickory	N
Juglandaceae	<i>Carya laciniosa</i>	Shellbark hickory, kingnut	N
Juglandaceae	<i>Carya ovata</i>	Shagbark hickory	N
Juglandaceae	<i>Carya tomentosa</i>	Mockernut hickory	N
Juglandaceae	<i>Juglans nigra</i>	Black walnut	N
Juglandaceae	<i>Juglans cinerea</i>	Butternut	N
Lauraceae	<i>Sassafras albidium</i>	Sassafras	N
Magnoliaceae	<i>Liriodendron tulipifera</i>	Tulip-tree, Yellow poplar	N

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Magnoliaceae	<i>Magnolia acuminata</i>	Cucumber tree	N
Moraceae	<i>Maclura pomifera</i>	Osage orange	E
Moraceae	<i>Morus alba</i>	White mulberry	E
Moraceae	<i>Morus rubra</i>	Red mulberry	N
Oleaceae	<i>Fraxinus americana</i>	White ash	N
Oleaceae	<i>Fraxinus pennsylvanica</i>	Red (Green) ash	N
Pinaceae	<i>Pinus virginiana</i>	Virginia pine	N
Plantanaceae	<i>Platanus occidentalis</i>	American sycamore	N
Rosaceae	<i>Amelanchier arborea</i>	Common serviceberry	N
Rosaceae	<i>Prunus americana</i>	American plum	N
Rosaceae	<i>Prunus serotina</i>	Black cherry	N
Rosaceae	<i>Pyrus sp.</i>	Wild crab apple	E
Rutaceae	<i>Phellodendron japonicum</i>	Amur corktree	E
Salicaceae	<i>Populus alba</i>	White poplar	E
Salicaceae	<i>Populus deltoides</i>	Cottonwood	N
Salicaceae	<i>Salix alba</i>	White willow	E
Salicaceae	<i>Salix babylonica</i>	Weeping willow	E
Salicaceae	<i>Salix interior</i>	Sandbar willow	N
Salicaceae	<i>Salix nigra</i>	Black willow	N
Simaroubaceae	<i>Ailanthus altissima</i>	Tree-of-heaven	E
Ulmaceae	<i>Celtis occidentalis</i>	Hackberry	N
Ulmaceae	<i>Ulmus americana</i>	American elm	N
Ulmaceae	<i>Ulmus rubra</i>	Slippery elm	N

## Shrubs

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Anacardiaceae	<i>Rhus radicans</i>	Poison ivy	N
Berberidaceae	<i>Berberis thunbergii</i>	Japanese barberry	E
Betulaceae	<i>Corylus americana</i>	Hazelnut	N
Bigoniaceae	<i>Campsis radicans</i>	Trumpet creeper	N
Caprifoliaceae	<i>Lonicera japonica</i>	Japanese honeysuckle	E
Caprifoliaceae	<i>Lonicera maackii</i>	Shrubby honeysuckle	E
Caprifoliaceae	<i>Sambucus canadensis</i>	Black elderberry	N
Caprifoliaceae	<i>Viburnum lantanoides</i>	Hobblebush	N
Caprifoliaceae	<i>Viburnum prunifolium</i>	Black haw	N
Celastraceae	<i>Celastrus orbiculata</i>	Asian (Oriental) bittersweet	E
Celastraceae	<i>Celastrus scandens</i>	Climbing (American) bittersweet	N
Celastraceae	<i>Euonymus alatus</i>	Winged euonymus (burning bush)	E
Celastraceae	<i>Euonymus atropurpurea</i>	Wahoo	N
Celastraceae	<i>Euonymus fortunei</i>	Chinese spindle tree	E
Cornaceae	<i>Cornus amomum</i>	Silky cornel	N
Cornaceae	<i>Cornus florida</i>	Flowering dogwood	N

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Cornaceae	<i>Cornus obliqua</i>	Pale dogwood	N
Cornaceae	<i>Cornus rugosa</i>	Round leaved dogwood	N
Cornaceae	<i>Cornus stolonifera</i>	Red-osier dogwood	E
Corylaceae	<i>Alnus serrulata</i>	Brookside alder, Smooth alder	N
Elaeagnaceae	<i>Elaeagnus umbellata</i>	Autumn olive	E
Lauraceae	<i>Lindera benzoin</i>	Spicebush	N
Leguminosae	<i>Amorpha fruticosa</i>	False indigo	N
Leguminosae	<i>Wisteria frutescens</i>	American wisteria	E
Leguminosae	<i>Wisteria sinensis</i>	Chinese wisteria	E
Menispermaceae	<i>Menispermum canadense</i>	Canada moonseed	N
Oleaceae	<i>Ligustrum sinense</i>	Chinese privet	E
Oleaceae	<i>Ligustrum vulgare</i>	European privet	E
Rosaceae	<i>Craetaegus spp</i>	Hawthorn	N
Rosaceae	<i>Physocarpus opulifolius</i>	Ninebark	N
Rosaceae	<i>Prunus virginiana</i>	Choke cherry	N
Rosaceae	<i>Rosa multiflora</i>	Multiflora rose	E
Rosaceae	<i>Rosa palustris</i>	Swamp rose	N
Rosaceae	<i>Rubus occidentalis</i>	Black raspberry	N
Rosaceae	<i>Rubus phoenicolasius</i>	Wineberry	E
Rosaceae	<i>Rubus odoratus</i>	Purple-flowered raspberry	N
Rosaceae	<i>Rubus sp.</i>	Blackberry	N
Rosaceae	<i>Spiraea tomentosa</i>	Steeplebush	N
Rosaceae	<i>Spiraea japonica</i>	Japanese Meadowsweet	E
Rubiaceae	<i>Cephalanthus occidentalis</i>	Buttonbush	N
Rubiaceae	<i>Diodia virginiana</i>	Larger buttonbush	N
Rutaceae	<i>Ptelea trifoliata</i>	Hoptree	N
Smilacaceae	<i>Smilax rotundifolia</i>	Common greenbrier	N
Staphyleaceae	<i>Staphylea trifolia</i>	Bladdernut	N
Styracaceae	<i>Halesia tetraptera</i>	Mountain silverbell	N
Vitaceae	<i>Ampelopsis cordata</i>	Heartleaf peppervine	N
Vitaceae	<i>Parthenocissus quinquefolia</i>	Virginia creeper	N
Vitaceae	<i>Vitis labrusca</i>	Fox grape	N
Vitaceae	<i>Vitis riparia</i>	Riverbank grape	N
Vitaceae	<i>Vitis vulpina</i>	Winter grape	N

### Herbaceous Plants

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Acanthaceae	<i>Justicia americana</i>	Water willow	N
Agavaceae	<i>Yucca filamentosa</i>	Yucca	E
Alismataceae	<i>Alisma subcordatum</i>	Common water plantain	N

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Alismataceae	<i>Sagittaria latifolia</i>	Duck potato	N
Alismataceae	<i>Sagittaria rigida</i>	Stiff arrowhead	E
Amaranthaceae	<i>Achyranthes japonica</i>	Japanese chafflower	E
Amaranthaceae	<i>Amaranthus hybridus</i>	Common pigweed	N
Amaranthaceae	<i>Amaranthus spinosus</i>	Spiny amaranth	E
Apiaceae	<i>Angelica atropupurea</i>	Purple angelica	N
Apiaceae	<i>Cicuta maculata</i>	Water hemlock	N
Apiaceae	<i>Conium maculatum</i>	Poison hemlock	E
Apiaceae	<i>Cryptotaenia canadensis</i>	Honewort	N
Apiaceae	<i>Daucus carota</i>	Queen Anne's lace	E
Apiaceae	<i>Erigenia bulbosa</i>	Harbinger of Spring; Salt and Pepper	N
Apiaceae	<i>Heracleum maximum</i>	Cow parsnip	N
Apiaceae	<i>Osmorhiza longistylis</i>	Smooth sweet cicely	N
Apiaceae	<i>Sanicula canadensis</i>	Black snakeroot	N
Apiaceae	<i>Sanicula gregaria</i>	Clustered snakeroot	N
Apiaceae	<i>Sium suave</i>	Water parsnip	N
Apiaceae	<i>Thaspium trifoliatum</i>	Woodland meadow parsnip	N
Apocynaceae	<i>Apocynum cannabinum</i>	Indian hemp	N
Araceae	<i>Arisaema dracontium</i>	Green dragon	N
Araceae	<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	N
Araceae	<i>Arum italicum</i>	Italian arum	E
Asclepiadaceae	<i>Asclepias incarnata</i>	Swamp milkweed	N
Asclepiadaceae	<i>Asclepias syriaca</i>	Common milkweed	N
Asclepiadaceae	<i>Asclepias tuberosa</i>	Butterfly weed	N
Asclepiadaceae	<i>Cynanchum laeve</i>	Sandvine	N
Asteraceae	<i>Achillea millefolium</i>	Yarrow	E
Asteraceae	<i>Achillea ptarmica</i>	Sneezeweed	E
Asteraceae	<i>Ambrosia artemisifolia</i>	Common ragweed	N
Asteraceae	<i>Ambrosia trifida</i>	Giant ragweed	N
Asteraceae	<i>Antennaria neglecta</i>	Field pussytoes	N
Asteraceae	<i>Arctium minus</i>	Common burdock	E
Asteraceae	<i>Artemesia annua</i>	Annual wormwood	E
Asteraceae	<i>Artemesia vulgaris</i>	Common mugwort	E
Asteraceae	<i>Aster divaricatus</i>	Whitewood aster	N
Asteraceae	<i>Aster lateriflorus</i>	Calico aster	N
Asteraceae	<i>Aster novae-angliae</i>	New England aster	N
Asteraceae	<i>Aster ontarionus</i>	Bottomland aster	N
Asteraceae	<i>Aster pilosus</i>	White heath aster	N
Asteraceae	<i>Aster prenanthoides</i>	Crooked stem aster	N
Asteraceae	<i>Aster simplex</i>	Panicked aster	N
Asteraceae	<i>Aster vimineus</i>	Small white aster	N

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Asteraceae	<i>Bidens cernua</i>	Beggars ticks, Bar marigold	N
Asteraceae	<i>Bidens frondosa</i>	Devil's beggars ticks	N
Asteraceae	<i>Bidens polyepsis</i>	Tickseed sunflower	E
Asteraceae	<i>Bidens tripartita</i>	Beggars ticks, Tickseed	N
Asteraceae	<i>Cacalia suaveolens</i>	Sweet Indian plantain	N
Asteraceae	<i>Cirsium arvense</i>	Canada thistle	E
Asteraceae	<i>Cirsium discolor</i>	Field thistle	N
Asteraceae	<i>Conyza canadensis</i>	Horseweed	N
Asteraceae	<i>Coreopsis lanceolata</i>	Lance-leaved tickseed	N
Asteraceae	<i>Echinacea purpurea</i>	Purple coneflower	A
Asteraceae	<i>Eclipta alba</i>	Herb of stumps	N
Asteraceae	<i>Erechtites hieracifolia</i>	Pilewort	N
Asteraceae	<i>Erigeron annuus</i>	White top	N
Asteraceae	<i>Erigeron canadensis</i>	Horseweed	N
Asteraceae	<i>Erigeron philadelphicus</i>	Philadelphia flea bane	N
Asteraceae	<i>Erigeron strigosus</i>	Daisy fleabane	N
Asteraceae	<i>Eupatorium coelestinum</i>	Mistflower	N
Asteraceae	<i>Eupatorium fistulosum</i>	Joe-pye weed	N
Asteraceae	<i>Eupatorium hyssopifolium</i>	Hyssop-leaved thoroughwort	N
Asteraceae	<i>Eupatorium perfoliatum</i>	Boneset	N
Asteraceae	<i>Eupatorium purpureum</i>	Wide leaved Joe-pye weed	N
Asteraceae	<i>Eupatorium rugosum</i>	White snakeroot	N
Asteraceae	<i>Eupatorium serotinum</i>	Late flowering thoroughwort	N
Asteraceae	<i>Galinsoga ciliata</i>	Devil's delight, Raceweed	E
Asteraceae	<i>Gnaphalium obtusifolium</i>	Everlasting, Cudweed	N
Asteraceae	<i>Gnaphalium purpureum</i>	Purplish cudweed	N
Asteraceae	<i>Gnaphalium uliginosum</i>	Low cudweed	N
Asteraceae	<i>Helenium autumnale</i>	Yellow sneezeweed	N
Asteraceae	<i>Helianthus decapetalus</i>	Thin leaved sunflower	N
Asteraceae	<i>Helianthus tuberosus</i>	Jerusalem artichoke	N
Asteraceae	<i>Hieracium pratense</i>	King devil, Field hawkweed	E
Asteraceae	<i>Hieracium venosum</i>	Rattlesnake weed	N
Asteraceae	<i>Lactuca canadensis</i>	Wild lettuce	N
Asteraceae	<i>Lactuca floridana</i>	Florida blue lettuce	N
Asteraceae	<i>Lactuca scariola</i>	Compass plant	E
Asteraceae	<i>Leucanthemum vulgare</i>	Ox-eye daisy	E
Asteraceae	<i>Polymnia canadensis</i>	White-flowered leafcup	N
Asteraceae	<i>Prenanthes altissima</i>	Tall white lettuce	N
Asteraceae	<i>Ratibida pinnata</i>	Gray coneflower	A
Asteraceae	<i>Rudbeckia laciniata</i>	Tall coneflower	N
Asteraceae	<i>Senecio aureus</i>	Golden ragwort	N
Asteraceae	<i>Senecio glabellus</i>	Yellowtop	N

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Asteraceae	<i>Silphium perfoliatum</i>	Cup-plant	N
Asteraceae	<i>Solidago caesia</i>	Blue-stemmed goldenrod	N
Asteraceae	<i>Solidago canadensis</i>	Canada goldenrod	N
Asteraceae	<i>Solidago giganta</i>	Late goldenrod	N
Asteraceae	<i>Solidago graminifolia</i>	Grass-leaved goldenrod	N
Asteraceae	<i>Sonchus asper</i>	Spiny sow thistle	E
Asteraceae	<i>Taraxacum officinale</i>	Common dandelion	E
Asteraceae	<i>Tussilago farfara</i>	Coltsfoot	E
Asteraceae	<i>Verbesina alternifolia</i>	Wingstem	N
Asteraceae	<i>Verbesina occidentalis</i>	Small yellow crownbeard	N
Asteraceae	<i>Veronia gigantea</i>	Tall ironweed	N
Asteraceae	<i>Veronia noveboracensis</i>	New York ironweed	N
Asteraceae	<i>Xanthium italicum</i>	Hairy cocklebur	N
Balasaminaceae	<i>Impatiens capensis</i>	Spotted touch-me-not	N
Balasaminaceae	<i>Impatiens pallida</i>	Pale touch-me-not	N
Berberidaceae	<i>Podophyllum peltatum</i>	Mayapple	N
Boraginaceae	<i>Cynoglossum virginianum</i>	Wild comfrey	N
Boraginaceae	<i>Hackelia virginiana</i>	Beggars lice	E
Boraginaceae	<i>Myosotis scorpioides</i>	Forget-me-not	E
Boraginaceae	<i>Mertensia virginica</i>	Virginia Bluebell	N
Brassicaceae	<i>Alliaria petiolata</i>	Garlic mustard	E
Brassicaceae	<i>Arabis laevigata</i>	Smooth rock grass	E
Brassicaceae	<i>Arabis lyrata</i>	Lyreleaf rockcress	N
Brassicaceae	<i>Barbarea vulgaris</i>	Yellow rocket, Winter cress	E
Brassicaceae	<i>Brassica nigra</i>	Black mustard	E
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's purse	E
Brassicaceae	<i>Cardamine hirsuta</i>	Hoary bittercress	E
Brassicaceae	<i>Cardamine impatiens</i>	A bittercress	E
Brassicaceae	<i>Cardamine pratensis</i>	Cuckoo-flower	E
Brassicaceae	<i>Cardamine diphylla</i>	Crinkleroot	N
Brassicaceae	<i>Dentaria laciniata</i>	Cutleaf toothwort	N
Brassicaceae	<i>Hesperis matronalis</i>	Dame's rocket	E
Brassicaceae	<i>Lepidium campestre</i>	Field cress	E
Brassicaceae	<i>Lepidium virginicum</i>	Wild peppergrass	N
Brassicaceae	<i>Rorippa islandica</i>	Marsh yellow cress	N
Brassicaceae	<i>Rorippa palustris fernaldiana</i>	Common yellow cress	N
Brassicaceae	<i>Rorippa sylvestris</i>	Creeping yellow cress	N
Brassicaceae	<i>Sibara virginica</i>	Virginia cress	N
Brassicaceae	<i>Sisymbrium altissimum</i>	Thimble mustard	E
Campanulaceae	<i>Campanula americana</i>	Tall bell flower	N
Campanulaceae	<i>Triodanis perfoliata</i>	Venus' looking glass	N
Cannabinaceae	<i>Cannabis sativa</i>	Hemp	E

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Cannabinaceae	<i>Humulus japonicus</i>	Japanese hops	E
Cannabinaceae	<i>Humulus lupulus</i>	Common hops	N
Capparaceae	<i>Cleome spinosa</i>	Spiderflower	E
Caryophyllaceae	<i>Cerastium viscosum</i>	Sticky chickweed	E
Caryophyllaceae	<i>Dianthus armeria</i>	Deptford pink	E
Caryophyllaceae	<i>Myosoton aquaticum</i>	Giant chickweed	E
Caryophyllaceae	<i>Saponaria officinalis</i>	Bouncing bet	E
Caryophyllaceae	<i>Silene nevea</i>	Snowy campion	N
Caryophyllaceae	<i>Stellaria aquatica</i>	Water mouse ear chickweed	E
Caryophyllaceae	<i>Stellaria graminea</i>	Lesser stitchwort	E
Caryophyllaceae	<i>Stellaria media</i>	Common chickweed	E
Celastraceae	<i>Celastrus scandens</i>	Climbing bittersweet	N
Chenopodiaceae	<i>Chenopodium album</i>	Lamb's quarters	E
Chenopodiaceae	<i>Chenopodium ambrosoides</i>	Mexican tea	E
Chenopodiaceae	<i>Chenopodium botrys</i>	Jerusalem oak, Feather geranium	E
Clusiaceae	<i>Hypericum ellipticum</i>	Elliptic leaved St. John's wort	N
Clusiaceae	<i>Hypericum mutilum</i>	Dwarf St. John's wort	N
Clusiaceae	<i>Hypericum punctatum</i>	Dotted St. John's wort	N
Commelinaceae	<i>Commelina communis</i>	Asiatic day-flower	E
Commelinaceae	<i>Commelina virginica</i>	Virginia day-flower	N
Convolvulaceae	<i>Convolvulus sepium</i>	Hedge bindweed	N
Convolvulaceae	<i>Ipomoea coccinea</i>	Red morning glory	E
Convolvulaceae	<i>Ipomoea hederacea</i>	Ivy leaved morning glory	E
Convolvulaceae	<i>Ipomoea lancunosa</i>	Small flowered morning glory	N
Convolvulaceae	<i>Ipomoea pandurata</i>	Wild potato vine	N
Convolvulaceae	<i>Tradescantia virginiana</i>	Spiderwort	N
Crassulaceae	<i>Sedum ternatum</i>	Wild stonecrop	N
Cucurbiaceae	<i>Citrullus lanatus</i>	Watermelon	E
Cucurbitaceae	<i>Echinocystis lobata</i>	Wild cucumber	N
Cucurbitaceae	<i>Sicyos ongulatus</i>	One seeded cucumber	N
Cuscutaceae	<i>Cuscuta gronovii</i>	Common dodder	N
Cyperaceae	<i>Carex aggregata</i>	Glomerate Sedge	N
Cyperaceae	<i>Carex blanda</i>	Sedge	N
Cyperaceae	<i>Carex bromoides</i>	Brome-like Sedge	N
Cyperaceae	<i>Carex conjuncta</i>	Sedge	N
Cyperaceae	<i>Carex crinita</i>	fringed sedge	N
Cyperaceae	<i>Carex crisatella</i>	Crested sedge	N
Cyperaceae	<i>Carex davisii</i>	Davis' Sedge	N
Cyperaceae	<i>Carex frankii</i>	Sedge	N
Cyperaceae	<i>Carex grayii</i>	Sedge	N
Cyperaceae	<i>Carex grisea</i>	Grey sedge	N

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Cyperaceae	<i>Carex gynandra</i>	Sedge	N
Cyperaceae	<i>Carex lurida</i>	Sedge	N
Cyperaceae	<i>Carex normalis</i>	Larger Straw Sedge	N
Cyperaceae	<i>Carex scoparia</i>	Sedge	N
Cyperaceae	<i>Carex tribuloides</i>	Sedge	N
Cyperaceae	<i>Carex vulpinoidea</i>	Foxtail sedge	N
Cyperaceae	<i>Cyperus erythrorhizos</i>	Sedge	N
Cyperaceae	<i>Cyperus esculentus</i>	Edible nutgrass	N
Cyperaceae	<i>Cyperus flavescens</i>	Sedge	N
Cyperaceae	<i>Cyperus lancastricensis</i>	Many flowered umbrella sedge	N
Cyperaceae	<i>Cyperus odoratus</i>	Sedge	N
Cyperaceae	<i>Cyperus refractus</i>	Reflexed umbrella sedge	N
Cyperaceae	<i>Cyperus rivularis</i>	Sedge	N
Cyperaceae	<i>Cyperus squarrosus</i>	Awed cyperus sedge	N
Cyperaceae	<i>Cyperus strigosus</i>	Sedge	N
Cyperaceae	<i>Dilichium arundiacum</i>	Three-way sedge	N
Cyperaceae	<i>Eleocharis acicularis</i>	Spikerush	N
Cyperaceae	<i>Eleocharis tenuis</i>	Spikerush, Kill cow	N
Cyperaceae	<i>Fimbristylis autumnales</i>	Sedge	N
Cyperaceae	<i>Kyllinga pumila</i>	Low killinga	N
Cyperaceae	<i>Scirpus atrovirens</i>	Wool grass	N
Cyperaceae	<i>Scirpus polyphyllus</i>	A bulrush, Wool grass	N
Cyperaceae	<i>Scirpus rubricosus</i>	Wool grass	N
Cyperaceae	<i>Scirpus validus</i>	Great bulrush	N
Dipsacaceae	<i>Dipsacus sylvestris</i>	Common teasel	E
Equisetaceae	<i>Equisetum sp.</i>	Horsetail	N
Euphorbiaceae	<i>Acalypha rhombidea</i>	Common three-seeded mercury	N
Euphorbiaceae	<i>Euphorbia vermiculata</i>	Hairy spurge	N
Euphorbiaceae	<i>Euphorbia lathyris</i>	Gopher Spurge	E
Euphorbiaceae	<i>Chamaesyce maculata</i>	Spotted spurge	N
Euphorbiaceae	<i>Chamaesyce nutans</i>	Eyebane	N
Fabaceae	<i>Amphicarpa bracteata comosa</i>	Hog peanut	N
Fabaceae	<i>Apios americana</i>	Groundnut	N
Fabaceae	<i>Chamaecrista fasciculata</i>	Partridge pea	N
Fabaceae	<i>Coronilla varia</i>	Crown fetch	E
Fabaceae	<i>Desmodium glabellum</i>	Dillen's tick trefoil	N
Fabaceae	<i>Lespedeza bicolor</i>	Japanese bushclover	E
Fabaceae	<i>Lespedeza cuneata</i>	Sericea	E
Fabaceae	<i>Melilotus alba</i>	White sweet clover	E
Fabaceae	<i>Melilotus officinalis</i>	Yellow sweet clover	E

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Fabaceae	<i>Strophostyles helvola</i>	Trailing Wild bean	N
Fabaceae	<i>Trifolium pratense</i>	Red clover	E
Fabaceae	<i>Trifolium repens</i>	White clover	E
Fabaceae	<i>Vicia dasycarpa</i>	Hairy fruit vetch	E
Fumariaceae	<i>Corydalis flavula</i>	Yellow corydalis	N
Geraniaceae	<i>Geranium carolinianum</i>	Carolina cranesbill	N
Haloragaceae	<i>Myriophyllum heterophyllum</i>	Two-leaved water milfoil	N
Hydrocharitaceae	<i>Vallisneria americana</i>	Eel grass, water celery	N
Hydrophyllaceae	<i>Hydrophyllum canadense</i>	Broad leaved waterleaf	N
Iridaceae	<i>Iris pseudacorus</i>	Yellow iris	E
Iridaceae	<i>Sisyrinchium angustifolium</i>	Narrow-leaf blue-eyed-grass	N
Juncaceae	<i>Juncus acuminatus</i>	Rush	N
Juncaceae	<i>Juncus canadensis</i>	Rush	N
Juncaceae	<i>Juncus effusus</i>	Common rush	N
Juncaceae	<i>Juncus filiformes</i>	Thread Rush	N
Juncaceae	<i>Juncus tenuis</i>	Yard rush	N
Lamiaceae	<i>Agastache neptoides</i>	Yellow giant hyssop	N
Lamiaceae	<i>Agastache scrophulariaefolia</i>	Purple giant hyssop	N
Lamiaceae	<i>Blephilia hirsuta</i>	Hairy woodmint	N
Lamiaceae	<i>Collinsonia canadensis</i>	Horse balm, Richweed	N
Lamiaceae	<i>Glechoma hederacea</i>	Ground Ivy	E
Lamiaceae	<i>Lamium amplexicaule</i>	Henbit	E
Lamiaceae	<i>Lamium purpureum</i>	Purple dead nettle	E
Lamiaceae	<i>Lycopus americanus</i>	Water horehound	N
Lamiaceae	<i>Lycopus virginicus</i>	Bugleweed	N
Lamiaceae	<i>Mentha arvensis</i>	Field mint	N
Lamiaceae	<i>Mentha piperita</i>	Peppermint	E
Lamiaceae	<i>Mentha rotundifolia</i>	Roundleaf mint	E
Lamiaceae	<i>Mentha verticillata</i>	Whorled mint	E
Lamiaceae	<i>Monarda fistulosa</i>	Wild bergamot	N
Lamiaceae	<i>Perilla frutescens</i>	Beefsteak plant	E
Lamiaceae	<i>Physostegia virginiana</i>	Dragon head	N
Lamiaceae	<i>Prunella vulgaris</i>	Heal-all	N
Lamiaceae	<i>Salvia lyrata</i>	Lyre-leaved sage	N
Lamiaceae	<i>Scutellaria laterifolia</i>	Mad-dog skullcap	N
Lamiaceae	<i>Stachys tenuifolia</i>	Smooth hedge nettle	N
Lamiaceae	<i>Teucrium canadense</i>	American germander	N
Lemnaceae	<i>Lemna sp.</i>	Duckweed	N
Liliaceae	<i>Allium canadense</i>	Meadow garlic	N
Liliaceae	<i>Allium cernuum</i>	Wild onion	N
Liliaceae	<i>Allium vineale</i>	Wild garlic	E
Liliaceae	<i>Erythronium americanum</i>	Yellow trout lily	N

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Liliaceae	<i>Lilium superbum</i>	Turk's cap lily	N
Liliaceae	<i>Ornithogalum nutans</i>	Drooping star-of-Bethlehem	E
Liliaceae	<i>Ornithogalum umbellatum</i>	Star-of-Bethlehem	E
Liliaceae	<i>Streptopus lanceolatus</i>	Twisted stalk	N
Liliaceae	<i>Uvularia sessifolia</i>	Sessile-leaved bellwort	N
Limnaceae	<i>Floerkea proserpinacoides</i>	False mermaid weed	N
Lobeliaceae	<i>Lobelia cardinalis</i>	Cardinal flower	N
Lobeliaceae	<i>Lobelia inflata</i>	Indian tobacco	N
Lobeliaceae	<i>Lobelia siphilitica</i>	Great blue lobelia	N
Lythraceae	<i>Ammannia coccinea</i>	Scarlet ammannia	E
Lythraceae	<i>Lythrum salicaria</i>	Purple loosestrife	E
Lythraceae	<i>Rotala ramosior</i>	Toothcup	N
Malvaceae	<i>Hibiscus moscheutos</i>	Swamp rose mallow	N
Malvaceae	<i>Hibiscus trionum</i>	Flower of an hour	E
Malvaceae	<i>Sida hermaphrodita</i>	Virginia mallow	E
Malvaceae	<i>Sida spinosa</i>	Prickly sida	E
Molluginaceae	<i>Mollugo verticillata</i>	Carpetweed	N
Nyctaginaceae	<i>Mirabilis nyctaginea</i>	Heartleaf umbrellawort	E
Oleaceae	<i>Ligustrum obtusifolium</i>	Border privet	E
Onagraceae	<i>Circaea lutetiana canadensis</i>	Enchanters night shade	N
Onagraceae	<i>Epilobium ciliatum glandulosum</i>	Northern willow herb	N
Onagraceae	<i>Epilobium coloratum</i>	Purple-leaved willow herb	N
Onagraceae	<i>Gaura biennis</i>	Gaura	N
Onagraceae	<i>Ludwigia alternifolia</i>	Seedbox	N
Onagraceae	<i>Ludwigia decurrens</i>	Primrose willow	N
Onagraceae	<i>Ludwigia leptocarpa</i>	Primrose willow	N
Onagraceae	<i>Ludwigia palustris</i>	Marsh purslane	N
Onagraceae	<i>Oenothera biennis</i>	Common evening primrose	N
Orchidaceae	<i>Goodyera sp.</i>	Rattlesnake plantain	N
Orchidaceae	<i>Platanthera lacer</i>	Ragged fringed orchid	N
Oxalidaceae	<i>Oxalis corniculata</i>	Creeping lady's sorrel	E
Oxalidaceae	<i>Oxalis dillenii</i>	Slender yellow wood sorrel	N
Oxalidaceae	<i>Oxalis europaea</i>	European yellow wood sorrel	N
Oxalidaceae	<i>Oxalis stricta</i>	Upright yellow wood sorrel	N
Oxalidaceae	<i>Oxalis violacea</i>	Violet wood sorrel	N
Papaveraceae	<i>Dicentra cucullaria</i>	Dutchman's breeches	N
Phytolaccaceae	<i>Phytolacca americana</i>	Pokeweed	N
Plantaginaceae	<i>Plantago lanceolata</i>	English plantain	E
Plantaginaceae	<i>Plantago rugelii</i>	Common plantain	N
Poaceae	<i>Agrimonia parviflora</i>	Small-flowered agrimony	N
Poaceae	<i>Agrimonia sp.</i>	Agrimony	N

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Poaceae	<i>Agrostis perennans</i>	Autumn bent grass	N
Poaceae	<i>Agrostis stolonifera</i>	Creeping bent grass	N
Poaceae	<i>Arthraxon hispidus</i>	Jointed grass	E
Poaceae	<i>Bromus sp.</i>	Grass	N,E
Poaceae	<i>Chasmanthium latifolium</i>	Wild oats	N
Poaceae	<i>Cinna arundinacea</i>	Wood reed grass	N
Poaceae	<i>Dactylis glomerata</i>	Orchard grass	E
Poaceae	<i>Digitaria ischaemum</i>	Smooth crab grass	N
Poaceae	<i>Digitaria sanguinalis</i>	Crabgrass	N
Poaceae	<i>Echinochloa crusgalli</i>	Barnyard grass	N
Poaceae	<i>Echinochloa muricata</i>	Barnyard grass	E
Poaceae	<i>Eleusine indica</i>	Goose grass	E
Poaceae	<i>Elymus canadensis</i>	Canada wild rye	N
Poaceae	<i>Elymus virginicus</i>	Virginia wild rye	N
Poaceae	<i>Eragrostis hypnoides</i>	Creeping lovegrass	N
Poaceae	<i>Eragrostis pectinacea</i>	Lovegrass	N
Poaceae	<i>Festuca elatior</i>	Meadow tall fescue	E
Poaceae	<i>Festuca subverticillata</i>	Nodding fescue	N
Poaceae	<i>Geum sp.</i>	Avens	N
Poaceae	<i>Glyceria striata</i>	Fowl mannagrass	N
Poaceae	<i>Leersia orzyoides</i>	Rice cutgrass	N
Poaceae	<i>Leersia virginica</i>	White grass	N
Poaceae	<i>Leptochloa mucronata</i>	Red sprangletop	E
Poaceae	<i>Microstegium vimineum</i>	Eulalia, Japanese stiltgrass	E
Poaceae	<i>Miscanthus sinensis</i>	Chinese silvergrass	E
Poaceae	<i>Muhlenbergia frondosa</i>	Wirestem muhly	N
Poaceae	<i>Muhlenbergia sp.</i>	Muhly grass	N,E
Poaceae	<i>Panicum capillare</i>	Witch grass	N
Poaceae	<i>Panicum clandestinum</i>	Deer tongue grass	N
Poaceae	<i>Panicum dichotomiflorum</i>	Spreading witchgrass	N
Poaceae	<i>Panicum stipitatum</i>	Tall flat panic grass	N
Poaceae	<i>Panicum virgatum</i>	Switch grass	N
Poaceae	<i>Paspalum fluitans</i>	Riverbank paspalum	E
Poaceae	<i>Phalaris arundinacea</i>	Reed canary grass	N
Poaceae	<i>Phyllostachys nigra</i>	Black bamboo	E
Poaceae	<i>Poa pratensis</i>	Kentucky bluegrass	E
Poaceae	<i>Setaria faberii</i>	Giant fox-tail grass	E
Poaceae	<i>Sorghum halepense</i>	Johnson grass	E
Poaceae	<i>Spartina pectinata</i>	Prairie cordgrass	N
Poaceae	<i>Tridens flavus</i>	Purple top	N
Poaceae	<i>Triticum aestivum</i>	Common wheat	E
Poaceae	<i>Uniola latifolia</i>	Wild oats	N

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Polemoniaceae	<i>Phlox divaricata</i>	Wild blue phlox	N
Polemoniaceae	<i>Phlox maculata</i>	Wild sweet William	N
Polygonaceae	<i>Fallopia japonica</i>	Japanese knotweed	E
Polygonaceae	<i>Fallopia sachalinensis</i>	Sachaline	E
Polygonaceae	<i>Polygonum arifolium</i>	Halberdleaf tearthumb	N
Polygonaceae	<i>Polygonum careyi</i>	Carey's knotweed	N
Polygonaceae	<i>Polygonum cespitosum</i>	Asiatic water pepper	E
Polygonaceae	<i>Polygonum cilinode</i>	Mountain bindweed	N
Polygonaceae	<i>Polygonum coccineum</i>	Water smartweed	N
Polygonaceae	<i>Polygonum convolvulus</i>	Black bindweed	E
Polygonaceae	<i>Polygonum hydropiper</i>	Common smartweed	N
Polygonaceae	<i>Polygonum hydropiperoides</i>	Mild water pepper	N
Polygonaceae	<i>Polygonum lapathifolium</i>	Dock leaved smartweed	N
Polygonaceae	<i>Polygonum pensylvanicum</i>	Pennsylvania smartweed	N
Polygonaceae	<i>Polygonum perfoliatum</i>	Mile-a-minute	E
Polygonaceae	<i>Polygonum persicaria</i>	Lady's thumb	E
Polygonaceae	<i>Polygonum punctatum</i>	Water smartweed	N
Polygonaceae	<i>Polygonum sagittatum</i>	Arrowleaf tearthumb	N
Polygonaceae	<i>Polygonum scandens</i>	Climbing false buckwheat	N
Polygonaceae	<i>Polygonum scandens eristatum</i>	Hedge buckwheat	N
Polygonaceae	<i>Polygonum virginianum</i>	Virginia knotweed	N
Polygonaceae	<i>Rumex acetosella</i>	Sheep sorrel	E
Polygonaceae	<i>Rumex altissimus</i>	Pale dock, Tall dock	N
Polygonaceae	<i>Rumex crispus</i>	Curly dock	E
Polygonaceae	<i>Rumex obtusifolius</i>	Broadleaf dock	E
Polygonaceae	<i>Rumex patienta</i>	Patience dock	E
Polygonaceae	<i>Rumex verticillatus</i>	Water dock	N
Polypodiaceae	<i>Matteuccia pensylvanica</i>	Ostrich fern	N
Polypodiaceae	<i>Onoclea sensibilis</i>	Sensitive fern	N
Polypodiaceae	<i>Polystichum acrostichoides</i>	Christmas fern	N
Portulacaceae	<i>Claytonia virginica</i>	Spring beauty	N
Portulacaceae	<i>Portulaca oleracea</i>	Common purselane	E
Potederiaceae	<i>Heteranthera reniformis</i>	Kidney-leafed Mud plantain	N
Primulaceae	<i>Lysimachia vulgaris</i>	Garden lysimachia	E
Primulaceae	<i>Lysimachia ciliata</i>	Fringed loosestrife	N
Primulaceae	<i>Lysimachia nummularia</i>	Moneywort	E
Ranunculaceae	<i>Clematis virginiana</i>	Virgins bower	N
Ranunculaceae	<i>Ranunculus abortivus</i>	Kidneyleaf crowfoot	N
Ranunculaceae	<i>Ranunculus ficaria</i>	Lesser celandine	E
Ranunculaceae	<i>Ranunculus recurvatus</i>	Hooked crowfoot	N
Ranunculaceae	<i>Ranunculus repens</i>	Creeping buttercup	E

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Ranunculaceae	<i>Ranunculus sceleratus</i>	Cursed crowfoot	N
Ranunculaceae	<i>Thalictrum polygamum</i>	Tall meadowrue	N
Ranunculaceae	<i>Thalictrum pubescens</i>	Late meadowrue	N
Rhamnaceae	<i>Rhamnus caroliniana</i>	Carolina buckthorn, Indian cherry	N
Rosaceae	<i>Duchesnea indica</i>	Indian strawberry	E
Rosaceae	<i>Geum canadense</i>	White avens	N
Rosaceae	<i>Geum laciniatum</i>	Rough avens	N
Rosaceae	<i>Geum macrophyllum</i>	Large leaved avens	N
Rosaceae	<i>Geum vernum</i>	Spring avens	N
Rosaceae	<i>Potentilla canadensis</i>	Dwarf cinquefoil	N
Rosaceae	<i>Potentilla norvegica</i>	Rough cinquefoil	N
Rubiaceae	<i>Diodia virginiana</i>	Virginia buttonweed	N
Rubiaceae	<i>Galium circaezans</i>	Wild licorice	N
Rubiaceae	<i>Galium triflorum</i>	Sweet scented bedstraw	N
Rubiaceae	<i>Gallium aparine</i>	Cleavers	N
Rubiaceae	<i>Gallium obtusum</i>	Stiff marsh bedstraw	N
Rubiaceae	<i>Gallium tinctorium</i>	Clayton's bedstraw	N
Rubiaceae	<i>Houstonia caerulea</i>	Bluet	N
Rubiaceae	<i>Spermacoce glabra</i>	Buttonweed	N
Saururaceae	<i>Saururus cernuus</i>	Lizard's Tail	N
Saxifragaceae	<i>Heuchera americana</i>	American alumroot	N
Saxifragaceae	<i>Penthorum sedoides</i>	Ditch stonecrop	N
Saxifragaceae	<i>Saxifraga virginiana</i>	Early saxifrage	N
Scrophulariaceae	<i>Chelone glabra</i>	Turtlehead	N
Scrophulariaceae	<i>Gratiola neglecta</i>	Hedge hyssop	N
Scrophulariaceae	<i>Linaria vulgaris</i>	Butter and eggs, Toadflax	E
Scrophulariaceae	<i>Lindernia dubia</i>	False pimpernel	N
Scrophulariaceae	<i>Mimulus alatus</i>	Winged monkeyflower	N
Scrophulariaceae	<i>Mimulus moschatus</i>	Muskflower	E
Scrophulariaceae	<i>Mimulus ringens</i>	Square-stemmed monkeyflower	N
Scrophulariaceae	<i>Penstemon laevigatus</i>	Smooth beardtongue	N
Scrophulariaceae	<i>Scrophularia marilandica</i>	Maryland figwort	N
Scrophulariaceae	<i>Verbascum blattaria</i>	Moth mullein	E
Scrophulariaceae	<i>Verbascum thaspus</i>	Great mullein	E
Scrophulariaceae	<i>Veronica anagallis-aquatica</i>	Water speedwell	N
Scrophulariaceae	<i>Veronica arvensis</i>	corn speedwell	E
Scrophulariaceae	<i>Veronica hederifolia</i>	Ivy leaved speedwell	E
Scrophulariaceae	<i>Veronica peregrina</i>	Purslane speedwell	N
Smilacaceae	<i>Smilax glauca</i>	Saw brier	N
Smilacaceae	<i>Smilax hispida</i>	Hispid greenbrier	N
Solanaceae	<i>Datura stramonium</i>	Jimsonweed	E

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>ORIGIN *</b>
Solanaceae	<i>Lycopersicon esculentum</i>	Tomato	E
Solanaceae	<i>Physalis longifolia subglabrata</i>	Smooth ground cherry	N
Solanaceae	<i>Solanum americanum</i>	Black nightshade	N
Solanaceae	<i>Solanum carolinense</i>	Horse nettle	N
Solanaceae	<i>Solanum dulcamara</i>	Bittersweet	E
Sparganiaceae	<i>Sparganium androcladum</i>	Keeled staminate burreed	N
Sparganiaceae	<i>Sparganium eurycarpum</i>	Large burreed	N
Thelypteridaceae	<i>Thelypteris noveboracensis</i>	New York fern	N
Typhaceae	<i>Typha latifolia</i>	Broad-leaved cattail	N
Urticaceae	<i>Boehmeria cylindrica</i>	False nettle	N
Urticaceae	<i>Laportea canadensis</i>	Wood nettle	N
Urticaceae	<i>Pilea pumila</i>	Clearweed	N
Urticaceae	<i>Urtica dioica dioica</i>	Stinging nettle	E
Urticaceae	<i>Urtica dioica gracilis</i>	Wild nettle	N
Valerianaceae	<i>Valerianella sp.</i>	Corn salad	N
Valerianaceae	<i>Valeriana pauciflora</i>	Large-flowered Valerian	N
Verbenaceae	<i>Phyla lanceolata</i>	Fogfruit	N
Verbenaceae	<i>Verbena hastata</i>	Blue vervain	N
Verbenaceae	<i>Verbena urticifolia</i>	White vervain	N
Violaceae	<i>Viola papilionacea</i>	Common blue violet	N
Violaceae	<i>Viola sororia</i>	Downy wood violet	N
Violaceae	<i>Viola striata</i>	Striped violet	N
Zosteraceae	<i>Potamogeton crispus</i>	Curly pondweed	E
Zosteraceae	<i>Potamogeton foliosus</i>	Leafy pondweed	N
Zosteraceae	<i>Potamogeton pectinatus</i>	Sago pondweed	N

N = Native; E = Exotic; A = Adventive; I = Introduced

## Refuge Reptiles and Amphibians

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON_NAME</b>	<b>CLASS</b>	<b>STATUS</b>
Bufonidae	<i>Bufo americanus</i>	American Toad	Amphibia	N
Bufonidae	<i>Bufo woodhouseii fowleri</i>	Fowler's Toad	Amphibia	N
Pelobatidae	<i>Scaphiopus holbrookii</i>	Eastern spadefoot toad	Amphibia	N
Hylidae	<i>Hyla crucifer crucifer</i>	Northern Spring Peeper	Amphibia	N
Hylidae	<i>Hyla versicolor</i>	Gray Tree Frog	Amphibia	N
Plethodontidae	<i>Plethodon richmondii</i>	Ravine salamander	Amphibia	N
Plethodontidae	<i>Plethodon cinereus</i>	Red-backed salamander	Amphibia	N
Ranidae	<i>Rana catesbeiana</i>	Bullfrog	Amphibia	N
Ranidae	<i>Rana clamitans melanota</i>	Green Frog	Amphibia	N
Ranidae	<i>Rana palustris</i>	Pickerel Frog	Amphibia	N
Ranidae	<i>Rana pipiens</i>	Northern Leopard Frog	Amphibia	N
Proteidae	<i>Necturus maculosus</i>	Mudpuppy	Amphibia	N
Chelydridae	<i>Chelydra serpentina</i>	Snapping Turtle	Reptilia	N
Colubridae	<i>Elaphe obsoleta obsoleta</i>	Black Rat Snake	Reptilia	N
Colubridae	<i>Nerodia sipedon sipedon</i>	Northern Watersnake	Reptilia	N
Colubridae	<i>Thamnophis sirtalis sirtalis</i>	Eastern Garter Snake	Reptilia	N
Colubridae	<i>Lampropeltis triangulum</i>	Milk snake	Reptilia	N
Kinosternidae	<i>Sternotherus odoratus</i>	Musk turtle	Reptilia	N
Emydidae	<i>Chrysemys picta marginata</i>	Midland Painted Turtle	Reptilia	N
Emydidae	<i>Terrapene carolina carolina</i>	Eastern Box Turtle	Reptilia	N
Trionychidae	<i>Trionyx spiniferus spiniferus</i>	Eastern Spiny Softshell	Reptilia	N

## *Federal Laws and Mandates*

### **Emergency Wetland Resources Act of 1986**

This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act also requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

### **Endangered Species Act of 1973** (16 U.S.C. 1531-1544, 87 Stat. 884), as amended

Public Law 93-205, approved December 28, 1973, repealed the Endangered Species Conservation Act of December 5, 1969 (P.L. 91-135, 83 Stat. 275). The 1969 act had amended the Endangered Species Preservation Act of October 15, 1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through Federal action and by encouraging the establishment of State programs. The Act:

- Authorizes the determination and listing of species as endangered and threatened;
- Prohibits unauthorized taking, possession, sale, and transport of endangered species;
- Provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- Authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants;
- Authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and
- Authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act of any regulation issued thereunder.

### **Environmental Education Act of 1990** (20 USC 5501-5510; 104 Stat. 3325)

Public Law 101-619, signed November 16, 1990, established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program.

Responsibilities of the Office include developing and supporting programs to improve understanding of the natural and developed environment, and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a Federal grant program; and administering an environmental internship and fellowship program. The Office is required to develop and support environmental programs in consultation with other Federal natural resource management agencies, including the Fish and Wildlife Service.

### **Executive Order 11988, Floodplain Management**

The purpose of this Executive Order, signed May 24, 1977, is to prevent Federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, Federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

### **Executive Order 13112, Invasive Species**

The purpose of this Executive Order, signed on February 3, 1999, is to prevent the introduction of invasive species and provide for their control, as well as to minimize the economic, ecological, and human health impacts that invasive species cause. Under this Executive Order Federal agencies whose actions may affect the status of invasive species shall: (1) identify such actions, (2) use relevant programs and authorities to prevent, control, monitor, and research such species, and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.

### **Fish and Wildlife Act of 1956** (16 U.S.C. 742a-742j, not including 742 d-l; 70 Stat. 1119), as amended --

The Act of August 8, 1956, as frequently amended, establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also with a direction to administer the Act with regard to the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it directs a program of continuing research, extension, and information services on fish and wildlife matters, both domestically and internationally.

Section 7(a) of the Act (16 U.S.C. 742f; 70 Stat. 1122) requires the Secretary of the Interior to: 1) develop measures for "maximum sustainable production of fish"; 2) make economic studies of the industry and recommend measures to insure stability of the domestic fisheries; 3) undertake promotional and information activities to stimulate consumption of fishery products; 4) take steps "required for the development, advancement, management, conservation, and protection of the fisheries resources," and take steps *"required for the development, management, advancement, conservation, and protection of fish and wildlife resources" through research, acquisition of land and water or interests therein, development of existing facilities, and other means.* (Note: subsection 5 was amended and combined into subsection 4 by P.L. 95-616, November 8, 1978.)

### **Fish and Wildlife Improvement Act of 1978**

This act was passed to improve the administration of fish and wildlife programs and amends amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.

### **Historic Preservation Acts.**

There are various laws for the preservation of historic sites and objects.

**Antiquities Act** (16 USC 431 - 433) -- The Act of June 8, 1906, (34 Stat. 225) authorizes the President to designate as National Monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The Act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

**Archaeological Resources Protection Act** (16 U.S.C. 470aa - 470ll) -- Public Law 96-95, approved October 31, 1979, (93 Stat. 721) largely supplanted the resource protection provisions of the Antiquities Act for archaeological items.

This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal or Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from Federal or Indian land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any State or local law.

**Public Law 100-588**, approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the Act from \$5,000 to \$500, made attempting to commit an action prohibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the Nation.

**Archeological and Historic Preservation Act** (16 USC 469-469c) -- Public Law 86-523, approved June 27, 1960, (74 Stat. 220) as amended by Public Law 93-291, approved May 24, 1974, (88 Stat. 174) to carry out the policy established by the Historic Sites Act (see below), directed Federal agencies to notify the Secretary of the Interior whenever they find a Federal or Federally assisted, licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeological data. The Act authorized use of appropriated, donated and/or transferred funds for the recovery, protection and preservation of such data.

**Historic Sites, Buildings and Antiquities Act** (16 USC 461-462, 464-467) -- The Act of August 21, 1935, (49 Stat. 666) popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9, 1965, (79 Stat. 971) declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. As of January, 1989, 31 national wildlife refuges contained such sites.

**National Historic Preservation Act of 1966** (16 U.S.C. 470-470b, 470c-470n) -- Public Law 89-665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the States. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d).

The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 28, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.

As of January, 1989, 91 historic sites on national wildlife refuges have been placed on the National Register.

## **Land and Water Conservation Fund Act of 1948**

This act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources of for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.

**Migratory Bird Hunting and Conservation Stamp Act** (16 U.S.C. 718-718j, 48 Stat. 452), as amended

The "Duck Stamp Act," as this March 16, 1934, authority is commonly called, requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

**Migratory Bird Treaty Act** (16 U.S.C. §§ 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986 and 1989).

The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful. Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or

cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not.

### **National and Community Service Act of 1990** (42 USC 12401; 104 Stat. 3127)

Public Law 101-610, signed November 16, 1990, authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Several provisions are of particular interest to the U.S. Fish and Wildlife Service.

### **National and Community Service Act**

Will make grants to States for the creation of full-time and/or part-time programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive post-employment benefits of up to \$1000 per year for part-time and \$2500 for full-time participants.

### **National Environmental Policy Act of 1969** (P.L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by P.L. 94-52, July 3, 1975, 89 Stat. 258, and P.L. 94-83, August 9, 1975, 89 Stat. 424).

Title I of the 1969 National Environmental Policy Act (NEPA) requires that all Federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment."

The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

### **National Wildlife Refuge System Administration Act of 1966** (16 U.S.C. 668dd-668ee) --

This Act, derived from sections 4 and 5 of Public Law 89-669 (October 15, 1966; 80 Stat. 927), provides guidelines and directives for administration and management of all areas in the system, including "wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas." The Secretary is authorized to permit by regulations the use of any area within the system provided "such uses are compatible with the major purposes for which such areas were established."

### **National Wildlife Refuge System Improvement Act of 1997**

Public Law 105-57, amends the National Wildlife System Act of 1966 (16 U.S.C. 668dd-ee), providing guidance for management and public use of the Refuge System. The Act mandates that the Refuge System be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management.

The Act establishes priorities for recreational uses of the Refuge System. Six wildlife-dependent uses are specifically named in the Act: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These activities are to be promoted on the Refuge System, while all non-wildlife dependant uses are subject to compatibility determinations. A compatible use is one which, in the sound professional judgement of

the Refuge Manger, will not materially interfere with or detract from fulfillment of the Refuge System Mission or refuge purpose(s).

As stated in the Act, "The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

The Act also requires development of a comprehensive conservation plan for each refuge and management of each refuge consistent with the plan. When writing CCP, planning for expanded or new refuges, and when making management decisions, the Act requires effective coordination with other Federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination or developing a CCP.

### **North American Wetlands Conservation Act** (103 Stat. 1968; 16 U.S.C. 4401-4412)

Public Law 101-233, enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, U.S. and Mexico.

The Act converts the Pittman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006 to carry out the programs authorized by the Act, along with an authorization for annual appropriation of \$15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act.

Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

A North American Wetlands Conservation Council is created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. The Council is to be composed of the Director of the Service, the Secretary of the National Fish and Wildlife Foundation, a State fish and game agency director from each Flyway, and three representatives of different non-profit organizations participating in projects under the Plan or the Act. The Chairman of the Council and one other member serve ex officio on the Commission for consideration of the Council's recommendations.

The Commission must justify in writing to the Council and, annually, to Congress, any decisions not to accept Council recommendations.

### **Refuge Recreation Act of 1962**

This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

### **Refuge Revenue Sharing Act** (16 U.S.C. 715s)

Section 401 of the Act of June 15, 1935, (49 Stat. 383) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges.

Public Law 93-509, approved December 3, 1974, (88 Stat. 1603) required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as:

1) on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and

2) on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662), payment in lieu of taxes on public lands.

This amendment also authorized appropriations to make up any difference between the amount in the Fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county which suffer losses in revenues due to the establishment of Service areas.

### **Wilderness Act of 1964** (16 U.S.C. 1131-1136; 78 Stat. 890)

The Wilderness Act of 1964 directs the Secretary of the Interior to review, within ten years, every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a "minimum Tool" management approach which requires refuge managers to use the least intrusive methods, equipment and facilities necessary for administering the areas.

Appendix G

## *RONS and MMS Project Lists*

The Refuge Operating Needs System (RONS) project list and the Maintenance Management System (MMS) list associated with the Ohio River Islands NWR are presented here. The projects and associated costs are based on our current knowledge of the scope of each project. Full implementation assumes RONS and MMS projects are funded over the next 15 years.

### **Terms used in this Appendix G:**

**Project:** This list includes proposed projects expected to cost more than \$20,000. Table G-1 includes those projects currently in the RONS database. Table G-2 includes those projects proposed in the CCP.

**FTE:** Full Time Staffing Equivalent. One FTE equals one person working full time for one whole year; seasonal employees are considered 0.5 FTE.

**Cost, year 1:** Estimated costs incurred during the first year of a project. These are typically higher than recurring costs, due to construction, equipment purchase, or other start-up expenses.

**Cost, recurring:** Estimated average annual project cost for subsequent years; includes recurring salary and maintenance costs.

**Project duration:** Estimated length of time for each project. Since this CCP will be revised in 15 years, the "maximum project duration" is 15 years, even though some projects may continue into the next planning cycle.

**Table G-1:** *Proposed projects currently in the RONS database (FY2002).*

<b>Project</b>	<b>Staffing (FTEs)</b>	<b>Cost, year 1  (x \$1000)</b>	<b>Cost, recurring  (x \$1000)</b>	<b>Project Duration  (years)</b>
Accessible wildlife observation and fish platform		82	6	5
Restore bottomland hardwoods	.50 FTE	59	22	15
Endangered species, interjurisdictional fish, and native wildlife surveys	1.0 FTE	118	53	15
Informational kiosks and Refuge brochures		76	10	15
Interpretive trails and outdoor recreation	1.0 FTE	118	53	15
Refuge law enforcement and public outreach	1.0 FTE	117	52	15
Wheeling/Middle Island interpretive program		54	0	5

Native mussel reintroduction		36	10	15
Inventory resources, apply adaptive management techniques	1.0 FTE	128	63	15
Protect resources and ensure public safety	1.0 FTE	129	64	15
Improve maintenance of refuge infrastructure and equipment	1.0 FTE	122	57	15
Exotic plant control and bottomland hardwoods restoration	1.0 FTE	125	51	15
Remobilization of contaminants into fish and wildlife...	0.50 FTE	75	17	10
Increased public use opportunities and visitor access	1.0 FTE	140	45	15
Lewis and Clark celebration		89	0	1
Transportation for Refuge outdoor recreation	0.00	30	1	5
	0.00			
<b>TOTAL</b>	<b>9.00 FTE</b>	<b>\$1,498</b>	<b>\$504</b>	

**Table G-2:** *Additional projects proposed in CCP, none of which are currently identified in RONS database. Projects are listed by resource program area (biological, public use, and administrative) priority. Staff from projects below will come from above requested staff.*

<b>Project</b>	<b>Cost, year 1 (x \$1000)</b>	<b>Cost, recurring (x \$1000)</b>	<b>Project Duration (years)</b>	<b>CCP</b>
<b>Habitat Management Projects:</b>				
Mussel quarantine and captive rearing program	5	5	15	x
Install bird, butterfly and bat boxes	1		5	x
Revegetate/restore wetland habitat	10	5	5	x
Annually track status of zebra mussel	5	5	15	x
Shoreline stabilization and revegetation	20	20	15	x
Manage water levels to mimic natural fluctuations	5	2	15	x
Restore embayment habitat	8	8	15	x
Conduct cover-type mapping	20	10	5	x

<b>Public Use Projects:</b>				
Expand hunting program	15	2	5	x
Provide environmental education opportunities	10	2	15	x
Assist with off-site environmental education	30	2	15	x
Establish a Refuge "Friends Group"	10	3	5	x
<b>Administrative Projects:</b>				
Land Acquisition	1000	1000	15	x
Continue to rent GSA space for headquarters*	36	36	15	
Construct new Refuge headquarters	2000	200	10	x
Secure temporary quarters for volunteer and staff	50	10	5	x
<b>TOTAL</b>	<b>\$3,225</b>	<b>\$1,310</b>		

The list of projects and the priority ranking proposed for each program area is based on current needs and information and may be subject to change as new information becomes available.

**Table G-3.** *Projects currently backlogged in the Maintenance Management System (MMS) Database for the Ohio River Islands NWR .*

Project #	Project Name	Cost Estimate (\$1,000)
00001	Replace well used 1992 light duty work pick-up truck	\$25
01003	Replace 16' workboat, 50 horsepower (HP) motor and trailer with 20' boat with twin 50 HP motor and trailer	\$25
01004	Revamp 22" aluminum dive boat and replace 115 HP motor with twin 70 HP motor and trailer	\$26
01006	Rehabilitate deteriorated refuge support building on Middle Island	\$85
97002	Replace 1963 farm tractor with 35 HP 4x4 farm tractor	\$72
01001	Replace 4X4 vehicle (Chevrolet Tahoe or equivalent)	\$25
01002	Replace 4x4 vehicle (Chevrolet Suburban or equivalent)	\$45
01005	Remove deteriorated 1000' asphalt access road and 2 acre asphalt parking area at Buffalo Creek site. Construct visitor kiosk, gravel road and parking area.	\$257
96002	Rehabilitate 2.1 miles of rutted dirt road with gravel on Middle Island	\$63
97003	Conduct feasibility analysis of erosion control measures	\$104
00006	Construct refuge headquarters with visitor contact station	\$2,072

00003	Remove abandoned barn on Buckley Island	\$82
00004	Remove barn on Buckley Island	\$68
00005	Remove Buckley Island House	\$39
Total		\$2,988

## *Glossary of Terms*

**alternative** - a reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). Alternatives are different means of accomplishing refuge purposes and goals, contributing to the System mission, and resolving issues. [see also management alternative below].

**anadromous** - fish that spend a large proportion of their life cycle in the ocean and return to freshwater to breed.

**Area of Biological Significance (ABS)** - contiguous landscapes, typically defined by watersheds or other geomorphologic feature, containing trust species and other species and habitats of special concern.

**aquatic** - growing in, living in, or dependent upon water.

**benthic** - refers to micro-organisms living on the bottom of river or water body.

**biological or natural diversity** - the variety of life in all its forms.

**breeding habitat** - habitat used by migratory birds or other animals during the breeding season.

**buffer zones** - protective land borders around critical habitats or water bodies that reduce runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals and plants and their habitats.

**candidate species** - those species for which the Service has on file sufficient information on biological vulnerability and threats to propose them for listing.

**Categorical Exclusion (CE, CX, CATEX, CATX)** - a category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

**CCP** - see Comprehensive Conservation Plan.

**CFR** - Code of Federal Regulations.

**Challenge Cost Share Program** - a grant program administered by the Fish and Wildlife Service providing matching funds for projects supporting natural resource education, management, restoration and protection on Service lands, other public lands and on private lands.

**community type** - a particular assemblage of plants and animals, named for the characteristic plants.

**compatible use** - an allowed use that will not materially interfere with, or detract from, purposes for

which the unit was established (Service Manual 602 FW 1.4).

**compatibility determination** - a compatibility determination is required for a wildlife-dependant recreational use or any other public use of a refuge. A compatible use is one which, in the sound professional judgement of the Refuge Manager, will not materially interfere with or detract from fulfillment of the Refuge System Mission or refuge purpose(s)

**Comprehensive Conservation Plan/CCP** - a document that describes the desired future conditions of the refuge and provides long-range guidance and management direction to accomplish the purposes of the refuge, contribute to the mission of the System, and meet other relevant mandates.

**concern** - see Issue.

**conservation** - the management of natural resources to prevent loss or waste. Management actions may include preservation, restoration, and enhancement.

**conservation easement** - a legal agreement between a landowner and a land trust (a private, nonprofit conservation organization) or government agency that permanently limits a property's uses in order to protect its conservation values.

**cool-season grass** - introduced grass for crop and pastureland that grows in spring and fall and is dormant during hot summer months.

**cooperative agreement** - the legal instrument used when the principal purpose of the transaction is the transfer of money, property, services or anything of value to a recipient in order to accomplish a public purpose authorized by Federal statute and substantial involvement between the Service and the recipient is anticipated.

**Coordination Area** - a wildlife management area that is made available to a State, by "(A) cooperative agreement between the United States Fish and Wildlife Service and the State fish and game agency pursuant to section 4 of the Fish and Wildlife Coordination Act (16 U.S.C. 664); or (B) by long-term leases or agreements pursuant to the Bankhead-Jones Farm Tenant Act (50 Stat. 525; 7 U.S.C. 1010 et seq.)." States manage coordination areas but they are part of the Refuge System.

**cultural resource inventory** - a professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

**digitizing** - the process of converting information from paper maps into geographically referenced electronic files for a geographic information system (GIS).

**easement** - an agreement by which a landowner gives up or sells one of the rights on his/her property. For example, a landowner may donate a right of way across his/her property to allow community members access to a river. See also conservation easement.

**ecosystem** - a natural community of organisms interacting with its physical environment, regarded as a

unit.

**ecotourism** - a type of tourism that maintains and preserves natural resources as a basis for promoting economic growth and development resulting from visitation to an area.

**ecosystem approach** - a way of looking at socio-economic and environmental information based on ecosystem boundaries, rather than town, city, or county boundaries.

**ecosystem-based management** - an approach to making decisions based on the characteristics of the ecosystem in which a person or thing belongs. This concept takes into consideration interactions between the plants, animals, and physical characteristics of the environment when making decisions about land use or living resource issues.

**embayment** - drowned tributary mouths inundated by backwaters. In this plan, embayments can be thought of as "displaced wetlands" formed by impoundment of the Ohio River.

**emergent wetland** - wetlands dominated by erect, rooted, herbaceous plants.

**endangered species** - a federally protected species which is in danger of extinction throughout all or a significant portion of its range.

**environmental education** - education aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp et al. 1969).

**Environmental Assessment (EA)** - A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

**Environmental Impact Statement (EIS)** - A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).

**estuaries** - deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.

**estuarine wetlands** - "The Estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land." (Cowardin et al. 1979)

**extirpated** - no longer occurring in a given geographic area.

**federal land** - public land owned by the Federal government, including lands such as National Forests,

National Parks and National Wildlife Refuges.

**federally listed species** - a species listed under the federal Endangered Species Act of 1973, as amended, either as endangered, threatened or species at risk (formerly candidate species).

**Finding of No Significant Impact (FONSI)** - A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

**focus areas** - Within each Areas of Biological Significance, focus areas further delineate concentrations or "hot spots" for species and habitats of special concern (see Appendix----).

**forbs** - A flowering plant, excluding grasses, sedges, and rushes, that does not have a woody stem and dies back to the ground at the end of the growing season.

**forested land** - land dominated by trees. For the purposes of the impacts analysis in this document, all forested land was assumed to have the potential to be occasionally harvested, and forested land owned by timber companies was assumed to be harvested on a more intensive, regular schedule.

**forested wetlands** - wetlands dominated by trees.

**geographic information system (GIS)** - a computerized system used to compile, store, analyze and display geographically referenced information. Can be used to overlay information layers containing the distributions of a variety of biological and physical features.

**goal** - descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units.

**habitat fragmentation** - breaking up of a specific habitat into smaller unconnected areas. A habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.

**habitat conservation** - the protection of an animal or plant's habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced.

**habitat** - the place where a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for life and should be free of harmful contaminants.

**hydrologic or flow regime** - characteristic fluctuations in river flows.

**interjurisdictional fish** - populations of fish that are managed by two or more states or national or tribal governments because of the scope of their geographic distributions or migrations.

**interpretive facilities** - structures that provides information about an event, place or thing by a variety of means including printed materials, audiovisuals or multimedia materials. Examples of these would be kiosks which offer printed materials and audiovisuals, signs and trailheads.

**interpretive materials** - any tool used to provide or clarify information, explain events or things, or serve

to increase awareness and understanding of the events or things. Examples of these would be: (1) printed materials such as brochures, maps or curriculum materials; (2) audio/visual materials such as videotapes, films, slides, or audio tapes; and (3) interactive multimedia materials, such as cd-rom and other computer technology.

**invasive exotic species** - non-native species which have been introduced into an ecosystem, and, because of their aggressive growth habits and lack of natural predators, displace native species.

**grassroots conservation organization** - any group of concerned citizens who come together to actively address a conservation need.

**issue** - any unsettled matter that requires a management decision; e.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concerns, or the presence of an undesirable resource condition. Issues should be documented, described, and analyzed in the CCP even if resolution cannot be accomplished during the planning process (Service Manual 602 FW 1.4).

**land trusts** - organizations dedicated to conserving land by purchasing land, receiving donations of lands, or accepting conservation easements from landowners.

**local agencies** - generally referring to municipal governments, regional planning commissions or conservation groups.

**long term protection** - mechanisms such as fee title acquisition, conservation easements or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintenance of the species population at the site.

**management alternative** - a set of objectives and the strategies needed to accomplish each objective (Service Manual 602 FW 1.4).

**management plan** - a plan that guides future land management practices on a tract of land. In the context of this environmental impact statement, management plans would be designed to produce additional wildlife habitat along with the primary products, such as timber or agricultural crops. See cooperative agreement.

**management strategy** - a general approach to meet unit objectives. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (Service Manual 602 FW 1.4).

**mission statement** - succinct statement of the unit's purpose and reason for being.

**mitigation** - actions taken to compensate for the negative effects of a particular project. Wetland mitigation usually takes the form of restoration or enhancement of a previously damaged wetland or creation of a new wetland.

**National Environmental Policy Act of 1969 (NEPA)** - requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better

environmental decision making (from 40 CFR 1500).

**National Wildlife Refuge (refuge)** - a designated area of land, water, or an interest in land or water within the System, but does not include Coordination Areas.

**National Wildlife Refuge System (system)** - all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction.

**National Wildlife Refuge System Mission (mission)** - "The mission of the System is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

**native plant** - a plant that has grown in the region since the last glaciation and occurred before European settlement.

**non-consumptive, wildlife-oriented recreation** - photographing or observing plants, fish and other wildlife.

**non-point source pollution** - nutrients or toxic substances that enter water from dispersed and uncontrolled sites.

**Notice of Intent (NOI)** - a notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the Federal Register.

**objective** - an objective is a concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining management strategies, monitoring refuge accomplishments, and evaluating the success of the strategies. Also, see unit objective.

**occurrence site** - a discrete area where a population of a rare species lives or a rare plant community type grows.

**old field** - an area that was formerly cultivated or grazed and where woody vegetation has begun to invade. If left undisturbed, it will eventually succeed into a forest. Many old fields occur at sites marginally suitable for crop production or pasturing. Old fields are highly variable in the Northeast, depending on soil, land use history, and management.

**palustrine wetlands** - "The Palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0%." (Cowardin et al. 1979)

**Partners for Wildlife Program** - a voluntary habitat restoration program undertaken by the Fish and Wildlife Service in cooperation with other governmental agencies, public and private organizations, and private landowners to improve and protect fish and wildlife habitat on private lands while leaving the land in private ownership.

**partnership** - a contract or agreement entered into by two or more individuals, groups of individuals, organizations or agencies in which each agrees to furnish a part of the capital or some in-kind service, i.e., labor, for a mutually beneficial enterprise.

**payment in lieu of taxes** - see Revenue Sharing Act of 1935, Chapter One, Legal Context.

**piscivorous** - habitually feeding on fish.

**planning area** - a planning area may include lands outside existing planning unit boundaries currently studied for inclusion in the System and/or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning unit.

**planning team** - planning teams are interdisciplinary in membership and function. Teams generally consist of a Planning Team Leader; Refuge Manager and staff biologists; and other appropriate specialists (e.g., social scientist, ecologist, recreation specialist). Team members may come from our other programs and other Federal, Tribal, and State natural resource agencies. The planning team prepares the CCP.

**population monitoring** - assessments of the characteristics of populations to ascertain their status and establish trends related to their abundance, condition, distribution, or other characteristics.

**private land** - land that is owned by a private individual, group of individuals, or non- governmental organization.

**private landowner** - any individual, group of individuals or non-governmental organization that owns land.

**private organization** - any non-governmental organization.

**protection** - mechanisms such as fee title acquisition, conservation easements or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintenance of the species population at the site.

**public** - individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in the Service issues and those who do or do not realize that Service decisions may affect them.

**public involvement** - a process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

**public land** - land that is owned by the local, state, or Federal government.

**purposes of the refuge** - the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

**rare species** - species identified in Appendix 3-6 as Species of Special Emphasis due to their uncommon occurrence within the watershed.

**rare community types** - plant community types classified as rare by any of the four state Natural Heritage Programs. As used in this environmental impact statement, is inclusive of the exemplary community types. The types are listed in Appendix 3-4.

**Record of Decision (ROD)** - a concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation CFR 1505.2).

**refuge goals** - descriptive, open-ended and often broad statements of desired future conditions that convey a purpose but do not define measurable units (Writing Refuge Management Goals and Objectives: A Handbook).

**refuge purposes** - the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, a refuge unit, or refuge subunit, and any subsequent modification of the original establishing authority for additional conservation purposes (Service Manual 602 FW 1.4).

**refuge lands** - those lands in which the Service holds full interest in fee title, or partial interest such as easements.

**restoration** - the artificial manipulation of a habitat to restore it to its former condition. Involves taking a degraded grassland and re-establishing habitat for native plants and animals. Restoration usually involves the planting of native grasses and forbs, and may include shrub removal and prescribed burning.

**runoff** - water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface into a water body.

**species of concern** - a species not on the federal list of threatened or endangered species, but a species for which the Service or one of its partners has concerns.

**step-down management plans** - step-down management plans describe management strategies and implementation schedules. Step-down management plans are a series of plans dealing with specific management subjects (e.g., croplands, wilderness, and fire) (Service Manual 602 FW 1.4).

**stopover habitat** - habitat used during bird migration for rest and feeding.

**strategy** - a specific action, tool or technique or combination of actions, tools, and techniques used to meet unit objectives.

**threatened species** - a federally protected species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

**tributary** - a stream or river that flows into a larger stream, river or lake.

**trust resource** - one that through law or administrative act is held in trust for the people by the government. A federal trust resource is one for which trust responsibility is given in part to the federal government through federal legislation or administrative act. Generally, federal trust resources are those considered to be of national or international importance no matter where they occur, such as endangered species and species such as migratory birds and fish that regularly move across state lines. In addition to species, trust resources include cultural resources protected through federal historic preservation laws, nationally important and threatened habitats, notably wetlands, navigable waters, and public lands such as state parks and national wildlife refuges.

**unfragmented habitat** - large blocks of unbroken habitat of a particular type.

**unit objective** - desired conditions which must be accomplished to realize a desired outcome. Objectives are the basis for determining management strategies, monitoring refuge accomplishments, and measuring the success of the strategies. Objectives should be attainable and time-specific and may be stated quantitatively or qualitatively (Service Manual 602 FW 1.4).

**upland** - dry ground; other than wetlands.

**U.S. Fish and Wildlife Service Mission** - our mission is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

**varmint** - a bird or mammal that is considered undesirable or troublesome. Varmints at Ohio River Islands National Wildlife Refuge include woodchuck, opossum, coyote, skunk, European starlings and crows.

**vernal pool** - depressions holding water for a temporary period in the spring and used by a variety of amphibians for egg laying.

**vision statement** - concise statement of what the planning unit could be, or what we could do, in the next 10 to 15 years, based primarily upon the System mission and specific refuge purposes, and other relevant mandates.

**warm-season grass** - native prairie grass that puts on the most growth during summer when cool-season grasses are dormant.

**watchable wildlife** - all wildlife is watchable. A watchable wildlife program is a strategy to help maintain viable populations of all native fish and wildlife species by building an effective, well-informed constituency for conservation. Watchable wildlife programs are tools by which wildlife conservation goals can be met while at the same time fulfilling public demand for wildlife recreational activities (other than sport hunting, trapping or sport fishing).

**watershed** - the geographic area within which water drains into a particular river, stream or body of water. A watershed includes both the land and the body of water into which the land drains.

**wetlands** - The U.S. Fish and Wildlife Service's definition of wetlands states that "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface

or the land is covered by shallow water." (Cowardin et al 1979)

**wildlife management** - the practice of manipulating wildlife populations, either directly through regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.

**wildlife-dependent recreational use** - a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. These uses are the six priority general public uses of the Refuge System as established in the National Wildlife Refuge System Administration Act.

**wildlife-oriented recreation** - recreational activities in which wildlife is the focus of the experience. For example, sport hunting and fishing, and plant and animal viewing and photography.

## *Responses to Comments*

### **Review of, and the Service's Response to, Public Comments Received on the Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) for Ohio River Islands National Wildlife Refuge**

We reviewed and considered all letters received during the public comment period for Ohio River Islands National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA). The Draft CCP/EA was originally released for 46 days of public review from February 13 to March 31, 2001, then extended an additional two weeks to April 13. Based on the analysis in the Draft CCP/EA, and our review of public comments, the Service has selected a Preferred Alternative. The Preferred Alternative basically includes all of Alternative B, the Proposed Action in the Draft CCP/EA, with a few modifications described in the discussion below. We will also issue a Finding of No Significant Impact (FONSI). The FONSI establishes that our decision will not significantly affect the quality of the human environment and does not require preparation of an Environmental Impact Statement.

We received numerous responses by way of oral testimony at public hearings or through submission of written or electronic documents. Comments were received from Federal and State agencies, local and national conservation and recreation organizations, and local residents. In the following discussion, we identify the issues raised and our response to those issues.

We also held four public meetings to solicit additional comments as follows:

- March 20, 2001 Community College of Beaver County, Monaca, PA
- March 22, 2001 Maysville Community College, Maysville, KY
- April 3, 2001 Historic Lafayette Hotel, Marietta, OH
- April 4, 2001 Parkersburg Municipal Building, Parkersburg, WV

The following is a list of agencies and groups who submitted comments:

- **US Army Corps of Engineers (USACE): Comments #1 through #4**
- **US Environmental Protection Agency (EPA): 5-11**
- **West Virginia Division of Natural Resources (WV DNR) 12-29**
- **Pennsylvania Game Commission (PGC) 30**
- **Ohio Division of Wildlife (ODOW) 31-42**
- **Marietta Boat Club (MBC) 43**
- **Animal Protection Institute (API) 44-49**
- **Ducks Unlimited (DU) 50-52**
- **National Trappers Association (NTA) 53-63**
- **Wildlife Management Institute (WMI) 64-76**
- **Ohio State Trappers Association (OSTA) 77-79**
- **Wildlife Legislative Fund of America (WLFA) 80-82**

- **Individuals 83-120**

All comments, and our subsequent responses, are listed below. We have arranged comments into the category or issue it primarily applied to, followed by our response to each comment. We have listed comment categories in the following order: trapping; fishing; hunting; boating; invasive and exotic species; erosion, sedimentation and water quality; environmental education, interpretation, and outreach; wildlife populations and management; land acquisition and protection; habitat management; public access and uses; coordination with states, and planning process; and other.

## **TRAPPING**

**18. COMMENT. Regulated trapping should be considered a wildlife-dependent recreational activity on the refuge. Requiring a permit is a sound management decision, but WV DNR is concerned that trapping may not be permitted annually (WV DNR).**

*RESPONSE. While trapping may be biologically sound in many cases (and can provide a recreational activity for some), it is not one of the six priority public uses identified in the Refuge Improvement Act. Under the Preferred Alternative, trapping will be conducted for management purposes when a need is determined by the Refuge based on habitat and wildlife monitoring data, and additional data from state resource agencies and health departments.*

**19. Raccoons are prevalent on islands (e.g., Blennerhassett). Strongly requests trapping permitted each year under state regulations (WV DNR). Blennerhassett Island is very different from Refuge islands. Part of the island is operated as a park, with associated dumpsters, garbage, and public disturbances. Trapping can still be conducted under state regulations on non-Refuge lands, which includes approximately 99% of available lands along the Ohio River. When the need for trapping arises on Refuge islands, trapping will be conducted on a permit basis as a management activity within state regulations. The refuge will coordinate with state resource agencies and health departments in determining the need.**

**47. Trapping as a population management tool is inhumane, ineffective, and unnecessary (API). Trapping is one method of population management, and can be effective when administered correctly.**

**48. Strongly oppose Service reliance on trapping as a means of protecting facilities and managing habitat, and request Service to explore alternative non-lethal methods of resolving problems (API). The Service considers trapping to be a viable option for population management if and when a need arises. We will also explore alternative non-lethal methods where appropriate.**

**72. Trapping is an important tool for reducing predation of various birds, so does not meet the test of logic to eliminate this activity on the refuge (WMI). The Service has not eliminated trapping from the Refuge, and will permit trapping to occur for management**

*purposes if and when the need arises. Determination of compatibility is set forth in Service regulations. Please see response to comment #37 also.*

**79. Sportsmen concentrate their efforts in areas of plentiful populations, to increase their chances of success. Thus, allowing these [consumptive] activities provide the population controls necessary to preserve habitat, while providing adequate populations for non-consumptive users (OSTA). Management trapping will be permitted based on habitat and population monitoring data.**

**80. Hunting and fishing should continue on refuge lands unless they are shown to be incompatible, as codified in the Refuge Improvement Act. Also, the definition of hunting includes trapping (WLFA). We agree that hunting and fishing should continue on Refuge lands, in accordance with an approved management plan. The Service, and the Refuge Improvement Act, does not define hunting to include trapping.**

**87. To wait until damage from furbearers is noticeable is too late. Furbearers utilize their habitat and environment as other species do, and thus play a role in their ecosystem. Trapping will be utilized as a management activity to control overpopulation or to address problems such as disease. This will be done when appropriate, as determined by the Refuge, in consultation with state resource agencies and public health officials.**

**92. Did the Service take into consideration the impact that the significant number of beavers on the two Pennsylvania islands would have on hardwood plantings? The Service did take into consideration the impact beavers could have on hardwood plantings, and we will continue to monitor the beavers and the success or failure of reforestation efforts. Erosion and exotic species have more impact, and thus pose a greater threat, to hardwood plantings than the natural predation of beavers.**

**96. As trappers, they question how the Service differentiates between hunting and trapping. Both control overpopulation, but the Service only considers hunting as a sport too. Congress determined with the Refuge Improvement Act that hunting is a priority public use, but trapping is not.**

**97. Trappers cannot use the refuge, but will be the first ones called when overpopulation occurs. Overpopulation would be one less problem to worry about if trapping was allowed on these lands. The general public is invited to use the refuge for enjoying a variety of compatible public uses. We agree trapping can be effective as one management tool to control overpopulation. The Refuge anticipates developing a Furbearer Management plan, with state natural resource agency input, by 2004.**

## **FISHING**

**5. Fish consumption advisory. Refuge should work with state agencies to inform public of risks (EPA). The Refuge has, and will continue to, refer the public to the appropriate state agency for the area they inquire about. Consumption advisories vary from state to state.**

**23. 24-hour angler access to bank and boat fishing should be available on all refuge property (WV DNR).** *Fishing is permitted on all refuge property, and current regulations allow fishing (and all priority public uses) one hour before sunrise to one hour after sunset. We will look at additional opportunities for fishing as embayment areas and wetlands are eventually acquired. Furthermore, we will begin review and update of the existing fishing plan in consultation with state resource agencies, anglers and other members of the public in 2003. The plan update would be accomplished with consideration and analysis of the demands and impacts of additional access points, bank fishing at night on Refuge lands, and opportunities for expanded fishing in acquired embayments and on islands. Also, we must define the conditions or stipulations that are necessary to keep such fishing activities and programs compatible with Refuge purposes and the System.*

**25. Because of open nature of river, and the river Fish Management Team establishing consistent regulations, setting of regulations by Service is not warranted and oversteps Service authority. State agencies, not federal agencies, are responsible for fishing regulations (WV DNR).** *The Service does not set fishing regulations (e.g., allowable species, number and size limits, and seasons), and does not propose to do so. The Refuge does set Refuge public use conditions (e.g., Refuge hours, no woodcutting, and no fires). We have revised the plan to clarify that the Refuge does not, and will not, set "fishing" regulations.*

**39. Eliminating night uses unnecessarily impacts legitimate activities such as night fishing, which has historically been a popular activity on the river (ODOW).** *Please see response to comment #23.*

**86. Concerns of losing black bass habitat.** *The Service believes that the embayments are not lifeless, and that they, like every ecosystem, will change over time. The fact that the river and embayments are altered ecosystems makes them even more complex, and solutions to habitat degradation require a watershed approach. Not all bass numbers have declined along the Ohio River and embayments -- for example, smallmouth and spotted bass populations are increasing in the middle and upper Ohio River (ORSANCO data, 1958-2000). As for issues with dredging, please see response to comment #93.*

**88. Tournament fishing should not be prohibited on Refuge lands.** *All activities on refuges are subject to certain criteria that ensures that the use will not materially interfere with or detract from the Refuge System mission or purposes of the refuge. Like other aspects of the fishing program, tournament fishing will be considered in the step-down plan discussed in response to comment #23.*

**94. Fishing (tournament and recreational) has a great economical impact to local communities. Eliminating or restricting fishing would negatively impact many people and businesses.** *The Service agrees that fishing has a positive economical impact to local communities. The Service has not proposed eliminating fishing in our plan.*

## HUNTING

**21. Requests refuge remain open during hunting season. Restricting access to one hour before sunrise seems capricious and arbitrary (WV DNR).** *The Refuge is open during hunting season. Expanding refuge open hours to begin one hour before sunrise accommodates hunters who would like to set up before daylight (deer and waterfowl hunters, primarily). Refuge hours are for everybody -- night hour restrictions apply to all Refuge users, not just hunters, and are established primarily to provide undisturbed night time resting habitat for refuge wildlife.*

**26. Significant point of contention with curtailment of hounds to hunt, and prohibition of firearms for deer. Service uses poorly interpreted scientific studies (WV DNR).** *We have not seen any research that clearly demonstrates that use of pursuit hounds is compatible with the purposes of the Refuge and the fundamental wildlife conservation mission of the Refuge System. All of the studies cited showed that dogs can and do chase deer and other wildlife; pursuit dogs can and do range far on a chase (0.2 - 13.4 miles), and most of the deer chased (>70%) left their home range for a day or more at a time. Regardless of domestication, dogs are predators which maintain basic instincts to chase and hunt, and the predictability of their disturbance is diminished when they are off-leash (Sime 1999). The refuge has documented dogs off leash killing wildlife on the refuge. Dogs off-leash increase the effective range of human disturbance to wildlife. The presence of sensitive habitats, areas of significant wildlife concentrations, and/or competing public uses would all be subject to disturbance by the use of pursuit dogs. In addition, the effect of free running dogs on adjacent landowners and neighbors is considered in the compatibility determination. Given that refuge habitats are mostly small in size and close in proximity to wetland and aquatic habitats which support federal trust resources in the fall and winter, and deer and waterfowl hunting and wildlife observation are concurrent public uses which would be adversely impacted by free running dogs, the use of pursuit dogs on this Refuge is incompatible.*

*As for use of firearms to harvest deer, we are aware there are other options available to control deer populations if the need arises (such as hunting with primitive firearms), and we have not precluded any of them to date. Consideration will be given to permitting primitive weapon hunting where appropriate, and we are willing to coordinate with biological staffs of the state resource agencies to discuss logistics of an expanded deer hunting program (i.e., safety issues, hunter density, permit system, geographic limitations, sign needs, enforcement, etc.).*

**27. Dispute that pursuit dogs would disturb migrating and wintering birds on the refuge with the claim that the Refuge is not in a major flyway, and that many waterfowl avoid the area (WV DNR).** *The Ohio River Valley has in fact been recognized as important for waterfowl by the West Virginia DNR, identified as one of the state's four waterfowl focus areas for the Atlantic Coast Joint Venture of the North American Waterfowl Management Plan. Tens of thousands of waterfowl migrate through and/or winter throughout the Ohio River Valley each year, as evidenced by the Winter Waterfowl*

*Surveys of the surrounding states and refuge data. The Ohio River corridor has been greatly modified over the past 50 - 100 years, creating impounded waters and altered land use which favors waterfowl in numbers over historic levels. Besides waterfowl, the Ohio River Valley is an even more important corridor for migrating neotropical land birds, providing feeding and resting habitat along their route (Russ McClain, TNC, personal communication).*

**28. WV DNR states that hunting will not conflict with other user groups (WV DNR).** *The Service stands by its assertion that in the specific case of the Ohio River Islands Refuge, it is likely that conflicts between user groups would occur without certain restrictions in place. The small land base of each island would attract and intensify any conflict between users. (For instance, duck hunters could easily be disturbed by hounds. On Middle Island, the huge majority of users are there for wildlife observation, with a number of commenters noting that they enjoy the relative solitude of the island.)*

**29. There is a need to harvest more deer. Archery hunting is ineffective, and rifles are safer than the Service assumes (WV DNR).** *To date, the archery hunt on Refuge islands has been sufficient to control deer on the Refuge, as measured by the impacts of deer on Refuge vegetation and reforestation efforts. Additional data will be collected as part of the step-down plans for habitat management and wildlife inventory. The Refuge also complies with state laws by not allowing firearms to be discharged within 500' of any occupied dwelling. As noted in response to comment #26, we will consider expanding deer hunting opportunities and methods in consultation with resource agency staff. Furthermore, we would consider the harvesting of does before bucks to be a potentially viable option.*

**30. Service policy states that hunting regulations, to the extent practicable, be consistent with State fish and wildlife laws. Recommend revision of Alternative B to permit hunting of resident wildlife on Refuge consistent with State laws (PGC).** *The Refuge Improvement Act states that to the extent practicable, the Service should seek opportunities to coordinate management of the Refuge with management of fish and wildlife resources generally by the State or States in which the Refuge is located. The Refuge regulations proposed do not expand or diminish the States' authority to control fish and resident wildlife under State laws and regulations.*

**58. No legitimate reason for not allowing pursuit dogs during hunting seasons has been offered. The reason to protect ground-nesting birds is ludicrous as birds do not nest during hunting season (NTA).** *Protection of ground nesting birds is not used in the plan as justification for restrictions pertaining to pursuit dogs. See response to question #26.*

**62. Why is the Service insistent in enforcing more severe hunting restrictions (page 4-10) if hunting would not greatly affect populations? (NTA).** *The Refuge is working to provide all of the priority public uses. This necessitates time and space restrictions to accommodate various user groups.*

**66. The Service appears to have developed a preferred alternative that is philosophically opposed to hunting on the refuge. The Service purposely developed an alternative to diminish habitat for species that rely on early stages of succession (WMI).** *Our proposal for habitat management is focused on benefitting Service trust resources. The Service and the Refuge is not opposed to hunting - in fact, hunting is identified as a priority public use in Service policy as well as the Refuge CCP. Choosing to manage for a particular habitat will by necessity reduce the amount of another habitat type. Biologically sound choices are made based on which habitat makes the best contribution towards conserving federal trust resources - on this Refuge, more federal trust resources benefit from bottomland hardwood forest than old fields. However, there will always be natural openings of early successional habitat interspersed in the floodplain forest, and other non-Refuge lands in the watershed provide greater habitat for species that rely on early successional stages.*

**69. Deer and Canada goose populations are thriving in the area. WMI foresees need to have substantial control over deer densities (WMI).** *We agree that management of crop fields and food plots should not be a priority. Also, we agree that deer densities should be controlled.*

**70. WMI finds no credible evidence that pursuit hounds are injurious to wildlife populations. WMI does not extend argument to year-round training however. Also, WMI would support regulations to avoid disturbances if there are documented significant instances of pursuit dogs disturbing migrating birds (WMI).** *Please see the response to # 26. It is the sound professional judgement of the Refuge Manager and Refuge staff that use of dogs to chase small game mammals would add to the disturbance of non-target species, and could conflict with deer hunters, waterfowl hunters and other public users on the Refuge and its neighbors. The Service finds no credible evidence to support the contention that allowing use of pursuit dogs is compatible with the wildlife conservation purpose of the Refuge System or this Refuge. Furthermore, there are superior opportunities for sportsmen to hunt with pursuit dogs on non-Refuge lands that provide better and more appropriate habitat and structure for rabbit, squirrel, and raccoon hunting.*

**71. CCP fails to establish credible reason for deviating from state hunting, fishing and trapping regulations. The actions of Alternative B do not meet the standards of the Refuge Improvement Act concerning working with the states (WMI).** *Working in partnership with four states does not mean that all parties will always agree on everything. Focusing on the short list of items upon which we may disagree does a great disservice to those habitat, wildlife and public use goals upon which we all do agree. The Service has met and coordinated with the four states to address hunting, fishing and trapping issues on the Refuge. The Service and the states substantially agree on the vast majority of issues and management approaches. Due to the fact that the Refuge System is national in scope and serves a diverse public, our implementation of specific management techniques and public uses may vary from a state or other land manager. The Refuge Improvement Act does not mandate the Service to endorse and mirror all state hunting and fishing*

*regulations - in fact, the Act specifically states that in administering the Refuge System, the Service shall "... complement efforts of States ... to conserve fish and wildlife and their habitats...."*

*At the present time, West Virginia has 1.3 million acres managed by the State's Wildlife Resources Section for public wildlife-associated recreation, representing eight percent of the state's total land area. Any differences from state regulations that occur on Refuge lands and waters comprise less than 0.02% of any of the states, and would not affect any state from managing, controlling or regulating any resident species.*

**73. WMI supports promotion of women's hunting programs, and would like to see expanded opportunities for minorities and other under-served publics. Also, youth hunt can be accomplished before 2003 (WMI).** *We agree that hunting opportunities should be promoted for women, minorities, and other under-served publics. Such programs would be contingent upon sufficient staffing and funding. We stand ready to work with WMI and the states to provide additional opportunities.*

**111. Will islands be marked during hunting season? Many assume 'refuge' means a place of no hunting.** *The Refuge will achieve outreach through appropriate news releases, and will post notices on Middle Island, where a majority of public uses occur on the Refuge. The Refuge will not specifically mark all islands to notify that hunting is occurring.*

## **BOATING**

**2. Additional hunting, fishing and recreational opportunities may increase number of boaters (USACE).** *There is a small possibility that the number of boaters may increase, but not to a significant degree above existing levels. The Service assumes additional use of refuge islands would be redistributed from existing boaters towards Refuge activities. Increases in overall boating activity will likely be associated with non-wildlife dependent activities.*

**3. Address boating safety with education (USACE).** *We agree that promotion of boating safety is commendable. We will refer people to the appropriate state agency regarding boating safety when asked.*

**10. EPA supports Refuge plans to minimize fuel emissions from gas powered motors, but recreational use of waters account for greater threat to water quality (EPA).** *We agree.*

**11. Increased recreation will increase number of boaters. Address potential impact to wildlife and aquatic life (US EPA).** *Impacts to wildlife from boaters was addressed in the Environmental Consequences section of the Draft EA. Please see response to comment #2 for additional information on potential boating increases.*

**43. Boat club members are concerned about potential for losing current public access. They agree that integrity of islands should be maintained for wildlife and the public good, and**

**does not need to be a restricted zone (MBC).** *Restriction toward illegal night mooring on Refuge islands will continue to be administered. Acquisition of existing private islands will actually increase legal public use. Camping is not allowed or proposed on the Refuge, but additional trail development is part of the Preferred Alternative.*

**102. Avid boaters would not like to see restriction for boating or access in the Worthington marina area (RM 331).** *We have removed acquisition of embayments and wetlands from the Final CCP at this time, and will analyze expansion of the acquisition boundary for the Refuge in a subsequent Land Protection Plan (LPP).*

### **INVASIVE AND EXOTIC SPECIES**

**8. Plan addresses invasive species. Aspects of project that cause or promote spread of invasives should not be authorized (EPA).** *We concur. Measures are currently in place, and will continue, to help prevent the spread and introduction of invasive species.*

**9. Service should add Executive Order 13112 on Invasive Species to Appendix. Add Migratory Bird Treaty Act to Appendix (EPA).** *We concur. The final plan will be revised to include the documents you have noted.*

**17. WV DNR supports elimination of exotic plant species, but questions the time frame. Suggests a schedule developed that is prioritized by areas with greatest risk (WV DNR).** *Invasive plant removal is a time-consuming activity, with many logistical constraints. Areas will be prioritized in greater detail in the step-down Habitat Management Plan.*

**53. Requests an explanation of definition of "native species" (e.g., "are you considering species that existed when deer, elk, bear and buffalo could mostly wade the river, or after settlement and installation of navigational locks and dams?") (NTA).** *"Native species" is defined in a recent Service draft policy as "With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem."*

**108. Agree that Alternative B is the preferred plan. Reforestation with native hardwoods and exotic plant control should be maximized to offset losses.** *Comment has been noted.*

**112. Why is silver maple not on tree planting list? And, use one small island with mostly intact riparian community and no major erosion and invasives to be a "control".** *You are correct in that silver maple establishes itself with little help. No existing island meets the criteria that you mention.*

### **EROSION, SEDIMENTATION, WATER QUALITY**

**1. Coordination with Corps necessary for placement of material in river. Submit application at appropriate times (USACE).** *We agree.*

**6. Refuge needs to stay aware of states and EPA efforts with Total Maximum Daily Loads in regards to water quality (EPA).** *We will make every effort to coordinate.*

**7. EPA supports Service efforts to benefit water quality through education (EPA).**  
*Comment has been noted.*

**38. The historic and ongoing degradation that the Service identified is erroneous (ODOW).** *Habitat and aquatic resources within the Ohio River have declined from historic (i.e., pre-navigation dam) conditions. In the past twenty years, we agree that water quality has markedly improved and fish and mussel populations have rebounded, but not to the diversity and abundance of the pre-dam era.*

**68. Habitat management activities on the refuge only will contribute to decreased water quality if they are misapplied by Service personnel (WMI).** *We agree, and will implement all best management practices.*

**74. WMI recommends working with dredgers to cooperatively develop best management practices (WMI).** *We agree. The Refuge is actively coordinating with the Corps on maintenance dredging programs, and commercial sand and gravel dredgers, to protect sensitive resource areas.*

**93. Fisherman is concerned about silting in of backwaters, and the repercussions it would have on fish, and then wildlife. Although dredging is expensive, it may be the direction to go to preserve the lands and habitat.** *The Service is committed to working in the watershed to reduce sediment loading into embayments and backwaters. Water level management as discussed in the EA could help to consolidate sediments, and other actions in the plan will help reduce siltation too. Dredging is, at best, a short-term measure and not a long-term solution to siltation (same response to #86).*

**114. There should be on-going efforts to control erosion.** *There are efforts currently underway designed to help control erosion. These efforts will continue.*

#### **ENVIRONMENTAL EDUCATION, INTERPRETATION, AND OUTREACH**

**91. The ability to educate about modern conservation techniques and habitat management is vitally important.** *We agree that many areas of environmental education are very important.*

**103. Alternative B is the best way to preserve and protect embayments and islands from urban sprawl and fragmentation. Environmental education and outreach programs are critical to preserve these special places.** *We agree that outreach is critical to protect the special natural resources of the Ohio River.*

**119. Produce a pamphlet for each island to inform people of special zones and rules for each island. A zone permit could allow swimming and rope swings in certain areas.** *It is*

*cost prohibitive to produce a pamphlet for each island, but we will post appropriate signs as use and need indicate. Rope swings are inappropriate for National Wildlife Refuges, demonstrated as unsafe to people, and is not a wildlife-dependent activity.*

## **WILDLIFE POPULATIONS AND MANAGEMENT**

**16. Re-introduction of extirpated species should be coordinated with state. Extirpated fish species should be given higher priority in plan (WV DNR).** *We agree to continue coordination with the states to restore native fish and mussel species to the river. The plan will be updated to reflect the suggestion.*

**20. Requests furbearers be monitored annually. Plan places little emphasis on data collection coordination with state agency (WV DNR).** *Furbearer monitoring is covered in the plan (within mammals), and will be an important part of the step-down Furbearer Management Plan. Once management trapping occurs, the Refuge will use trappers' data to help provide basic survey information. Refuge staff will continue to collect data on sightings of mammals, including furbearers. The Refuge staff will continue to share native mussel information with our partners, and look forward to exchanging and coordinating fish and wildlife data with the four state resource agencies.*

**45. There is a lack of wildlife population data in the Draft CCP, as required by the Refuge Improvement Act (API).** *Species list are included in the appendix. Additional data collection will be implemented as part of the step-down Wildlife Inventory Plan for the Refuge.*

**51. Disturbed that in Alternative C, an increase in habitat diversity is looked upon as favorable towards game species. Service should focus on wildlife species of the region, regardless of their anthropomorphic tags (DU).** *The terms "game" and "non-game" are commonly used and understood by our state partners. The Service will focus on priority wildlife species found in the floodplain Alternative C is more favorable towards maximizing diversity of game species across multiple habitat types. We also stated in the Draft EA that many "...non-game species will likely benefit from the various management and protection practices that are primarily geared toward game and sportfish populations..." within Alternative C. Please see response to comment #89 for additional information regarding "game" and "non-game" species.*

## **LAND ACQUISITION AND PROTECTION**

*\* We have removed acquisition of embayments and wetlands from the Final CCP at this time, and will analyze expansion of the acquisition boundary for the Refuge in a subsequent Land Protection Plan (LPP) and Environmental Assessment. The LPP will undergo a public review and will be reviewed by our Director. The LPP is anticipated to be a detailed refinement of the land acquisition component presented in Alternative B of the December 2000 Draft CCP/EA, and will consider all public and partner comments and recent changes in land status. It will identify the specific parcels proposed for*

*Service acquisition, their priority, and the protection options recommended. The Service still hopes to add strategically located lands and waters to the Refuge System until, in partnership with others, it represents America's diverse ecosystems and sustains the nation's fish, wildlife, and plant resources.*

*The following comments received that pertain to land acquisition of embayments and wetlands will be considered in development of the forthcoming LPP.*

**32. ODOW takes exception to printed claim that they do not support refuge acquisition of embayments and other mainland property (ODOW).**

**35. ODOW would like to see a blend that allows for ecosystem management, providing as much wildlife-dependent recreation as possible. If the Service insists on limiting opportunities, ODOW recommends limiting effort in Ohio to conservation easements only (ODOW).**

**56. Object to Service acquiring embayments and wetlands. All four states and the local community are overwhelmingly against mainland expansion (NTA).**

**60. NTA endorses Alternative C, but still objects to mainland acquisitions (NTA).**

**75. WMI supports acquisition efforts, including embayments. WMI believes opposition of states is due to philosophical positioning (WMI).**

**82. The plan should be in line with management strategies of the states. Also, WLFA opposes expansion of the refuge if unable to work with states, and hopes available lands can be channeled to the states (WLFA).**

**83. Concerns with the proposed Pond Run embayment and the location of the nearby airport. Increasing wildlife could cause problems with aircraft.**

**84. Uhlands Run (RM 332.8) would seem to make a better acquisition site than Pond Run.**

**85. Concerns with closures or affects to marinas. Requests that locations at RM 330 and 333 are better than those locations at RM 331 and 339.**

**95. As landowners, they oppose acquisition of property in the area (Lee Creek, WV). What is the Service's acquisition strategy? Will the Service buy from willing sellers at this moment, then seek to acquire more later, or will the Service canvas the area to see if enough landowners would even be willing to sell before targeting for acquisition?**

**106. In favor of Alternative D, because if federal government does not preserve some national and international wildlife and habitat resources, who will?**

**109. Prompt acquisition as sites become available is vital, as development will always continue. Also urges easements and cooperative agreements if necessary to revegetate and protect riparian strips.**

## **HABITAT MANAGEMENT**

**15. Plant more mast-bearing trees, as opposed to silver maple, sycamore, and cottonwood (WV DNR).** *In addition to the three tree species mentioned in the comment (which were planted on one island in 1995 to test different reforestation techniques), the Refuge has already planted an additional 24 different native species of trees, including many mast-bearing species appropriate for the floodplain (butternut, black walnut, pin oak, shumard oak, swamp white oak, buckeye, American chestnut, shagbark and pignut hickory, pawpaw, spicebush, silky dogwood, black cherry, American plum, and persimmon). Other floodplain trees are appropriate and desirable even if they are not mast producing but because they produce good wildlife cavities (for owls, wood ducks, flying squirrels, etc.), rough or peeling bark (for bats), or have good horizontal branching for large nesting birds (such as great blue heron, osprey, and bald eagles). The Refuge will strive to restore the full complement of native floodplain trees to benefit a diversity of wildlife species.*

**63. Most of the refuge is in West Virginia, which is 80 percent covered with hardwoods. Management of 3,200 acres over 400 miles will not help or hurt any listed species (NTA).** *Although a majority of West Virginia may indeed be covered with upland hardwood forest, the Ohio River Valley has lost at least 65% of the forested floodplain habitat. Many state or federal species of concern depend on the forested floodplain habitat - thus, a principal management focus of the Refuge will be to provide appropriate habitat for these species.*

**65. The Partners-in-Flight plan for the area highlights species dependent on mature deciduous forest, but also prioritizes conservation for species dependent upon early successional shrub habitats. From a landscape perspective, the islands are too small, linear, and fragmented to meet needs of forest interior species. Few of the islands are configured to produce adequate areas of interior forest. WMI also note that early successional species (e.g., Bewick's Wren, Golden-winged warbler) have importance and may be helped through habitat management.** *The Ohio Hills Bird Conservation Area Plan also identifies 6 mature deciduous forest birds which do use the Refuge and would benefit from proposed habitat management goals. The WV Partners in Flight Team has developed locally relevant lists of Priority Species, and management guidelines to help maintain or enhance their habitat. Of the 20 priority WV species, only 4 are early successional species (blue-winged warbler, golden-winged warbler, prairie warbler, and loggerhead shrike). The Bewick's wren is not a priority species in WV because it is nearly extirpated from the state and little can be done to improve its status here (Buckelew and Hall 1994). In addition, the Bewick's wren is mostly a species of dry open country (Hall 1983), not typical of Ohio River floodplain habitats. The golden-winged warbler is uncommon in the Ohio River valley and is absent as a breeder because it is replaced in*

*the western part of the state by blue-winged warbler (Hall 1983), which does nest on the refuge. The Refuge will always have shrub layers and openings in the forest. The Refuge may not be able to help the Bewick's Wren or golden-winged warbler in the Ohio River Valley, but we can help 16 of the 20 bird species of concern in the area.*

*As to the comment that the refuge islands and mainland corridors are too small to be of value to birds, on the contrary, even small or linear patches of habitat are of immense value to migrating birds as feeding and stopover habitat during their long journeys between summer and winter habitats (J. Marinelli, Audubon 103(5): 96-101 (2001)). A 300' buffer is an acceptable guideline when possible, and hopefully future acquisitions added to the Refuge will be able to include at least such a buffer. Most of the islands are in fact 300' wide. Thus, the Refuge looks to serve as an "anchor" in working with other landowners to help the wildlife of the area. We believe that the Refuge is part of the solution, but not the whole solution. As stated by one program of the Ohio Department of Natural Resources (Division of Natural Areas and Preserves) one of the primary emphasis of their program is:*

*"... the maintenance and restoration of the forested corridors which cloak the stream banks and valleys of Ohio's scenic rivers. These forested corridors are variously referred to as riparian woodlands, forest buffers, or riparian corridor. Forested riparian corridors on Ohio rivers may vary in depth from as little as a single row of trees to extensive forests extending from hundreds to thousands of feet back from the stream channel. In Ohio riparian forests tend to be more extensive along rivers situated in the eastern half of the state. In the more urban and the agricultural lands of western Ohio riparian forests are generally more constricted seldom extending more than a few hundred feet back from the stream channel. It is in these heavily farmed and urbanized regions that forested stream corridors, even though they may be more constricted than many of their riparian counterparts in eastern Ohio, achieve their highest levels of importance as habitat for those species of birds, mammals, reptiles, amphibians, and other plants and animals which are dependent on forested habitats for their survival. In many areas of Ohio where the former woodlands have been reduced to small isolated woodlots usually no more than 10 to 50 acres in size, these forested stream corridors extending for miles in an unbroken band along the stream banks provide a large percentage of the woodland habitats required by so many species. This is particularly true for many of Ohio's breeding bird species"*

*(<http://www.dnr.state.oh.us/odnr/dnap/rivbirds/rivbirds.html>).*

**67. Loss of early successional forest habitat is the primary cause of American woodcock population declines, and Region 5 also has a Woodcock Plan, yet the declining species is not mentioned nor prioritized in the CCP (WMI).** *While Region 5 has published an American Woodcock Management Plan, the Ohio River floodplain is relatively insignificant in contributing to overall woodcock populations. Woodcock were never very abundant in WV before pioneer times, and their best habitat in the state is found in the high elevations of Canaan Valley (Proceedings of the 9<sup>th</sup> American Woodcock Symposium,*

2000). Woodcock do use refuge habitats during migration (primarily under the bottomland trees), but they are not usual nesters, nor year-round species. The Refuge cannot make its best contribution to the Refuge System by providing potential nesting habitat and management for a few woodcock to the detriment of other species that we can benefit.

**89. In discussion of habitat management, it appears within the plan that managing to benefit game species is always detrimental to other species.** *We agree that appropriate habitat management can benefit a multitude of species, both game and non-game. However, since the Refuge is relatively small and finite, certain choices must be made as to what is the most appropriate habitat for species of concern in the area. In the specific case of the Ohio River Islands, a focus towards management for species in an early successional habitat would come at the expense of managing for species dependent on the floodplain forest. The Refuge does not propose to manage "for" or "against" game or non-game species separately, but rather to manage for the full complement of species that would benefit from a particular habitat management goal, i.e., floodplain forest conservation.*

**90. For diversity of wildlife, you need diversity of habitat. There is a shortage of all types of habitat, not just mature hardwoods. Existing lands and new lands should be evaluated to determine which type of habitat is most suitable, thus providing the greatest benefit to the most species, and provide visitors with year round diversity of watchable wildlife.** *When evaluating the appropriate management direction for refuges, refuge managers must consider their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales according to new Service policy. We favor management that restores or mimics natural ecosystem processes or functions to achieve refuge purposes. Maintaining or restoring biological integrity is not the same as maximizing biological diversity. Maintaining biological integrity may entail managing for a single species or community at some refuges and combinations of species or communities at other refuges. For example, the Ohio River Islands contain habitats that is important for neotropical migratory birds. Maintaining that habitat (and, therefore, those species), even though it may reduce biological diversity at the refuge scale, helps maintain biological integrity and diversity at the ecosystem and national landscape scales.*

*We must ensure that our proposed management activities result in establishment of a community that fits within what we reasonably believe to have been the natural ecological setting, unless doing so conflicts with accomplishing refuge purposes.*

**101. Marietta/ Washington County League of Women Voters is in favor of Alternative B. They also support restoration and maintenance of native riparian and riverine habitat with a focus on wildlife conservation, limited controlled human impact including wake control, and the plan for education and awareness.** *The proposed action received support from many reviewers. Wildlife conservation remains as the fundamental mission of the entire National Wildlife Refuge System, and as the primary focus of the Refuge.*

**107. Most sportsmen probably do not understand it is counter-productive to hunt and fish in some places at any time. Many breeding areas, nursery areas, migratory stopping and feeding areas, rare or specialized habitat are places that should be protected at all times. All lands that the Service maintains are subject to compatibility. The Refuge must review all public uses prior to allowing them to occur in any area of the Refuge.**

**120. People around Paden and Williamson Islands may be willing to plow sections of the islands and plant fields of corn for wildlife. The Refuge appreciates the public support it receives from the community, and will always welcome additional volunteers. However, the Refuge does not consider cornfield to be a primary habitat for key species of the floodplain, and not in agreement with Refuge objectives.**

## **PUBLIC ACCESS AND USES**

**22. Increasing hours will not result in conflicts - it is not a problem on state wildlife management areas (WV DNR).** *The Service recognizes the assertion that conflicts of use has not been a problem on state wildlife management areas. The Refuge has already proposed to increase hours to accommodate sportsmen/women and other legitimate users. Our regulations are developed to conserve wildlife and their habitat, and not to "penalize" people. National Wildlife Refuges, as part of a System, attract a diverse public. The System must ensure that facilitation of the priority public uses remains appropriate and compatible with the Refuge System mission and the Refuge purpose - hence, some controls are required.*

**24. Agree that more trails are likely needed, but wonders why this type of disturbance is not approached with same caution as hunting (WV DNR).** *The Refuge conducts compatibility determinations on trails the same as for hunting. We recognize that hunting is an appropriate use on Refuge lands - thus, hunting is offered and promoted on the Refuge.*

**33. Numerous prohibitions and limitations on recreation is disturbing, and reflects Service's resistance to input from constituents (ODOW).** *The restrictions the Service has in place are to protect visitors and conserve wildlife and habitat. The Service has accepted input from all affected constituents and user groups throughout the planning process, and incorporated many suggestions and comments into the Preferred Alternative. Please see response to comment #22 also.*

**34. The six priority public uses are contravened by allowing Refuge Manager to determine what uses will be allowed or compatible. It is apparent that public meetings and comments are held to simply comply with requirements of law (ODOW).** *All six priority public uses are offered as part of the Preferred Alternative. Compatibility is confirmed by the Refuge Improvement Act, and is in place to ensure that wildlife and wildlife conservation comes first on National Wildlife Refuges.*

**36. Overtone of [internal review draft] plan related to consumptive recreational activities was negative. Service assumed that these activities would impact all other refuge users. Consumptive and non-consumptive uses are not mutually exclusive, especially when pressure is light (ODOW).** *The Draft CCP/EA was modified from the internal review draft. The Service offers and promotes consumptive recreational opportunities that are compatible with Refuge purposes and the mission of the Refuge System. We seek to accommodate all wildlife-dependent uses as appropriate and compatible.*

**37. Refuge Manager seems to have dictatorial authority to decide what constitutes compatible uses (ODOW).** *The Refuge Manager's authority is discussed in length in Parts 25, 26 and 29 of Title 50 of the Code of Federal Regulations that describe the process for determining whether or not a use of a National Wildlife Refuge is a compatible use. The Refuge Improvement Act required, among other things, that we designate the refuge official responsible for making compatibility determinations. The refuge manager was designated to be that person because he/she is in the best position to make an informed decision based on the site-specific nature of compatibility. To ensure consistency nationwide, concurrence from their Regional Chief on all compatibility determinations is built within that policy. We follow the same compatibility process throughout the National Wildlife Refuge System. When making a compatibility determination, refuge managers consider all information provided during the public review and comment period. In addition, anyone, at any time, may present relevant information on an existing, proposed, or denied use to the Refuge Manager, and this information may cause us to re-evaluate a use for compatibility.*

**59. The Service proposes building a fishing pier, but deny the public the opportunity to tie a rope to a tree for a swing (NTA).** *A rope swing is not an appropriate use of a National Wildlife Refuge. Please also see response to comment #119.*

**61. Alternative D is completely out of bounds. When the refuge was brought into being, it was specifically stated that traditional uses would continue (NTA).** *The Service is required to evaluate a reasonable range of actions, such as Alternative D, in the environmental assessment. The enabling legislation of the Refuge, in a 1989 EA, stated that all public uses (including traditional uses) would be evaluated to ensure that the use is compatible.*

**77. Concern that the plan will be a tool to exclude public from having access to islands and embayments (OSTA).** *We disagree. Future Refuge acquisitions will actually increase legal public use and access. The Refuge is open every day to the public, one hour before sunrise to one hour after sunset.*

**98. Questions the statement on Page 3-18 concerning decreasing beach use on Paden and Williamson Islands the last 5 years, and feel that in the future beach use will be even higher for many reasons.** *We will revise the text to state that illegal uses have decreased, and that future use on Paden and Williamson Islands may increase, due to the reasons you cite.*

**99. Current beach use may be affected by the signage, as they are intimidating and negative.** *We use approved National Wildlife Refuge boundary signs. The comment will be forwarded to the Regional Sign Coordinator.*

**110. A new facility is appropriate, and will create a presence.** *We agree that a new office and visitor contact station is appropriate, and will help create a positive presence in the area.*

**117. Wildlife is more likely to be disturbed by people carrying photo blinds or bird watchers. Consequently, daytime use inland on islands can disturb nocturnal wildlife as well.** *The document recognizes that disturbance may occur from any public use. The key is to balance priority public uses with wildlife conservation.*

### **COORDINATION WITH STATES, AND PLANNING PROCESS**

**12. WV DNR pleased to see some earlier concerns and comments addressed, but disappointed that comments regarding hunting restrictions were not incorporated (WV DNR).** *We appreciate acknowledgment that the planning team has listened to your concerns, and have adopted many changes to address those concerns (such as expanded use hours, consideration of additional deer hunt methods, refinement of the definition of trapping for management purposes, and re-evaluation of the fishing plan).*

**31. Ohio DOW claim their previous efforts resulted in no substantive changes, and therefore they have intentionally minimized their comments here. They resubmitted earlier comments (ODOW).** *Careful reading of the draft plan with earlier versions not available to the public demonstrates the Service's willingness to coordinate, consult with, and consider state agency comments. Many changes have been made.*

**40. DOW understands need for certain restrictions for safety reasons, or to minimize user conflicts, but it appears Service has made no effort to address state concerns (ODOW).** *The Service appreciates the state's understanding of the need for certain restrictions for safety reasons and to minimize user conflicts. Please see responses to comments #12 and #31 for additional information regarding Service efforts to address state concerns.*

**42. Refuge should bring regulations into alignment with states (ODOW).** *The four states all have differing regulations, but all uses on Refuge lands are still subject to evaluation for compatibility.*

**52. Plan should be as accommodating to the total community of outdoor sportsmen as possible (i.e., not instituting any restrictions on any outdoor pursuits that are permitted as lawful activities by the various wildlife agencies in whose jurisdiction the refuge resides (DU)).** *The Refuge plan must accommodate more than just sportsmen. The Refuge Improvement Act states that all priority public uses should be facilitated if found to be compatible. Please see response to comment #22 also.*

**55. Concerns with issues raised within planning process (NTA).** *Issues discussed in the Draft EA/CCP were brought forth by the general public during the extensive scoping process in developing the plan.*

**57. The Service has refused to use input from state partners and local individuals (NTA).** *Trapping for management is included as part of the Preferred Alternative. The Service considers all state agency concerns, but failure to adopt every state's suggestion does not translate to a refusal to listen by the Service. Please see response to comment #71 also.*

**78. Concern that the opinions of the state agencies appear to have been ignored (OSTA).** *State opinions and concerns are always considered, but sometimes they are not all adopted into our selected management strategy. Please see response to comment #57 also.*

**81. Congressional intent [of the Act] consistently encouraged a partnership between refuge managers and state agencies, yet all (three) agencies feel ignored (WLFA).** *The Service does recognize the importance of state input into all of our plans. Within this planning effort, we have communicated, coordinated, and listened, and have adopted many suggestions. The Service looks forward to working with the state agencies as allies in cooperating with each other to best conserve wildlife. The Northeast Region of the Service has recently instituted regular meetings with state resource agency directors to support this commitment.*

**104. Strongly in favor of Alternative D, but also highly cynical of the planning process.** *Your comment is acknowledged.*

**105. Even if the majority of the responding public vote in favor of another alternative, what difference would that make? The Service has already said it prefers Alternative B, and this is what probably will be finalized. Where is the plan that takes into account an anti-environment administration, budget cuts, a declining economy, increased pressures on all resources, public apathy, public greed, and public ignorance? The Service considers all comments. The eventual decision lies with the Regional Director.**

## **OTHER**

**4. Port of Pittsburgh is a busy shipping port (USACE).** *We will revise the text accordingly in the Final CCP.*

**13. Vision Statement. Suggest "conservation" replace "preservation" in wording (WV DNR).** *We will add the word conservation to the vision statement.*

**14. WV DNR would prefer a combination of Alternatives B and C (WV DNR).** *The WV DNR's preference for a combination of Alternatives B and C is duly acknowledged.*

**41. DOW disagrees with inference that Service authority extends beyond protection of trust species (ODOW).** *Service trust resources include National Wildlife Refuge lands.*

**44. Supports Alternative D (except for provision that allows trapping (API).** *The comment is noted.*

**46. The majority of Americans oppose recreational and commercial killing of wildlife on National Wildlife Refuges (API).** *Hunting and fishing are considered appropriate and legitimate uses of National Wildlife Refuges.*

**49. Since the plan lacks vital biological data, API requests Service produce another CCP (API).** *Additional data will be included in future step-down management plans.*

**50. Disappointed the plan was not available on the Internet (DU).** *Although the plan was made available in many places (although not online), future plans will likely be available via the Internet.*

**54. Object to Goal 5 - appears like agency has an agenda it will promote, which is lobbying and illegal (NTA).** *The development and intention of Goal 5 in the CCP is primarily to identify the staffing and equipment necessary for implementation of proposed actions and future management of the Refuge.*

**64. WMI does not support that Alternative B is the best strategy. None of the alternatives is satisfactory. All of the alternatives are constrained artificially to represent extremities in the conservation spectrum, and are based more on philosophical dogma than conservation needs (WMI).** *The Service evaluated a range of alternatives. The preferred alternative will be the one that best achieves the purposes of the refuge and helps fulfill the Refuge System mission. According to Service policy, the Regional Director's selected alternative could be the no action alternative, the proposed action, or a combination of alternatives presented. Consideration of all public comments is incorporated into the final plan.*

**76. WMI offers new alternative [a blend of Alternatives B and C] (WMI).** *The Service appreciates every practical suggestion to help conserve wildlife.*

**100. Would like to see Buffington Island preserved because of its historical values. Requests that the island be fixed up for future generations, with some recommendations.** *We are actively seeking assistance for bank stabilization and erosion control for all islands, including Buffington Island. We recognize the historical importance of Buffington Island, and the opportunity to educate the public to the natural and cultural values associated with the Refuge islands.*

**113. Recommend Alternative A. Also, recommend more law enforcement for trespassers and poachers.** *The comment is noted. Additional law enforcement is included as part of the Preferred Alternative.*

**115. Additional data is necessary to determine actual usage of islands.** *Refuge staff continues to monitor the islands, including weekends. With additional staffing as identified in the Preferred Alternative, we may be able to gather additional data to better assess actual usage.*

**116. Littering can be a problem by people staying overnight, but Federal and State agencies don't close down other areas due to littering, they try to zone, fine or educate.** *National Wildlife Refuges have a focus toward wildlife and wildlife conservation. Thus, Refuge lands are not administered the same as other parks and public lands (where the focus is often on providing maximum opportunities for recreation). Littering is not the primary reason for curtailing night time use of the Refuge.*

**118. Zoning is a good idea. The Service could zone for allowing small campfires with dead driftwood on some islands.** *Zoning is used in some cases to minimize conflicts among users. Small portable grills are allowed, but campfires are not allowed because of the habitat destruction caused (removal of available driftwood and cutting down of trees when driftwood is gone) and the fact that the refuge is closed at night to all uses.*

## **FINDING OF NO SIGNIFICANT IMPACT**

### **Ohio River Islands National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment**

The Ohio River Islands National Wildlife Refuge (Refuge) is composed of all or part of 21 islands covering over 3,200 acres. The Draft Comprehensive Conservation Plan and Environmental Assessment for the Refuge (December 2000) (CCP/EA) evaluated four management alternatives, carefully considering their impacts on the environment, their potential contribution to the mission of the National Wildlife Refuge System, and refuge purposes and goals. A brief summary of the four alternatives follows.

Alternative A: This alternative is the No Action Alternative as required by National Environmental Policy Act regulations. Selection of this alternative would maintain the status quo; there would be no significant changes to current management practices. This alternative serves as the baseline from which to compare the other three alternatives.

Alternative B: This alternative represented the Service's Proposed Action; that is, the alternative that was recommended for approval. Selection of this alternative would have included expansion of the Refuge by acquiring remaining islands and embayments, which total to over 8,000 acres. Alternative B would emphasize restoration and reforestation of native bottomland floodplain forest to the Ohio River. Opportunities for all six priority

public uses would improve, including an increased importance on environmental education and outreach programs.

Alternative C: This alternative would increase Refuge habitat diversity with increased management of early successional habitat. This habitat would also be more favorable for many game species and associated expanded consumptive recreational uses. Fishing, hunting and trapping allowable by state laws regulations would be offered and promoted. Selection of this alternative would also increase acquisition to over 8,000 acres.

Alternative D: This alternative would manage Refuge lands to provide and maximize undisturbed resting, feeding, and breeding areas for wildlife, especially migratory birds. All visitation would be tightly regulated and confined to certain designated areas. Hunting and fishing would be eliminated from all Refuge lands under this Alternative. Boating and shore use would also be prohibited on Refuge lands. Selection of this alternative would also increase acquisition to over 8,000 acres.

The Draft CCP/EA also included 10 Appendices which provided additional information supporting our analysis.

Based on the analysis provided in the Environmental Assessment and the comments received from the public, I have selected Alternative B (the Service's Proposed Action in the Draft CCP/EA), with the following modifications:

- We have added the word "conservation" to the vision statement, based on a suggestion of one of our state partners.
- We received a comment from one of the state resource agencies that extirpated fish species should be given higher priority in plan, and that re-introduction of extirpated species should be coordinated with the states. We agree to continue coordination with the states to restore native fish and mussel species to the river. The plan now reflects the suggestion.
- We have removed acquisition of embayments and wetlands from the CCP at this time, and will analyze expansion of the acquisition boundary for the Refuge in a subsequent Land Protection Plan (LPP). The LPP will undergo a public review and will be reviewed by our Director. The LPP is anticipated to be a detailed refinement of the land acquisition component presented in Alternative B, and will also consider public and partner comments on the Draft CCP/EA and recent changes in land status. It will identify the specific parcels proposed for Service acquisition, their priority, and the protection options recommended.
- We are aware there are other options available to control deer populations if the need arises (such as hunting with primitive firearms), and we have not precluded any of them to date. Consideration will be given to permitting primitive weapon hunting when appropriate, and we will coordinate with biological staffs of the state resource agencies to discuss logistics of an expanded deer hunting program (i.e., safety issues, hunter density, permit system, geographic limitations, sign needs,

enforcement, etc.) Similarly, we will work with the state resource agencies and health departments to utilize available data so that we may permit trapping for management purposes when a need is determined based on habitat and wildlife monitoring data. The Refuge anticipates developing a Furbearer Management plan by 2004. There will be additional opportunities for fishing if embayment areas and wetlands are eventually acquired. Thus, we will review and update the existing fishing plan in consultation with state resource agencies, anglers and other members of the public. The plan update would be accomplished with consideration and analysis of the demands and impacts of additional access points, bank fishing at night on Refuge lands, and opportunities for expanded fishing in acquired embayments and on islands. Also, we must define the conditions or stipulations that are necessary to keep such fishing activities and programs compatible with Refuge purposes and the System.

I have selected Alternative B as modified because it helps fulfill the mission of the National Wildlife Refuge System; best achieves Refuge purposes, vision and goals; maintains and, where appropriate, restores the ecological integrity of the Refuge; addresses the significant issues identified during the planning process; and is consistent with principles of sound fish and wildlife management.

I find that the implementation of Alternative B, with the modifications noted above, will not have a significant impact on the quality of the human environment in accordance with Section 102 (2) (c) of the National Environmental Policy Act. As such, I have concluded that an Environmental Impact Statement is not required, and this Finding of No Significant Impact is appropriate.

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Dr. Mamie A. Parker

Regional Director, Region 5 Date

U.S. Fish and Wildlife Service

Hadley, Massachusetts